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CREATIVE THINKING IN ART STUDENTS--AN EXPLORATORY STUDY.
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THE OBJECTIVES OF THIS STUDY WERE (1) TO TAKE BIBLIOGRAPHIC INVENTORY OF RESEARCH CONCEPTS AND METHODS IN CREATIVITY AND THE ARTS, (2) TO TEST A NUMBER OF THE CONCEPTS AND METHODS IN AN EXPLORATORY EMPIRICAL INVESTIGATION OF THE THOUGHT PROCESSES AND PERSONALITY CHARACTERISTICS OF ART STUDENTS, AND (3) TO FORMULATE A NUMBER OF ISSUES, CONCEPTS, AND TECHNIQUES AT LEAST POTENTIALLY CAPABLE OF STIMULATING AND GUIDING FURTHER SYSTEMATIC INQUIRY. THE STUDY REPORT PRESENTED A BIBLIOGRAPHY OF 150 JOURNAL ARTICLES AND BOOKS WITH A CROSS-INDEX ORGANIZED IN 6 CATEGORIES. THE IMPLICATIONS OF THIS LITERATURE WERE DISCUSSED WITH RESPECT TO THE COGNITIVE AND PERCEPTUAL PROCESSES, THE EARLY EXPERIENCES, THE SOCIOCULTURAL ENVIRONMENT, AND THE MOTIVATIONS OF THE ARTIST. OF 321 SECOND- AND THIRD-YEAR STUDENTS AT A DEGREE-GRANTING ART SCHOOL, 266 TOOK THE FIRST BATTERY AND 179 COMPLETED ALL 3 BATTERIES OF 18 COGNITIVE, PERCEPTUAL, AND PERSONALITY INSTRUMENTS AS WELL AS A BIOGRAPHICAL DATA QUESTIONNAIRE. MAJOR FINDINGS FROM DATA ANALYSIS WERE PRESENTED FOR (1) COMPARISON OF ART STUDENTS WITH AVAILABLE NORMS FOR VALUES, PERSONALITY, COGNITION, AND PERCEPTION, (2) COMPARISON OF ART STUDENTS IN DIFFERENT FIELDS OF SPECIALIZATION, (3) RELATIONSHIPS AMONG VARIOUS CRITERIA OF CREATIVITY, AND (4) COMPARISON OF "HIGH" AND "LOW" ACHIEVING ART STUDENTS. AMONG THE VALUES DIFFERENTIATING ART STUDENTS FROM OTHER STUDENTS WERE (1) VERY HIGH AESTHETIC VALUES, BUT VERY LOW ECONOMIC AND SOCIAL VALUES AND (2) GREAT COMMITMENT TO A SINGLE DOMINANT VALUE. IMPLICATIONS FOR FURTHER RESEARCH INCLUDED THE SUGGESTION THAT IT MIGHT BE FRUITFUL TO VIEW CREATIVITY AS COMPOSED TO TWO INTERLOCKING PROCESSES--(1) A GENERAL PROCESS UNDERLYING ALL TYPES OF CREATIVE ENDEAVOR AND (2) A SPECIFIC PROCESS RELEVANT TO A PARTICULAR FIELD OF ENDEAVOR. (JM)

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CREATIVE THINKING IN ART STUDENTS:

An Exploratory Study

(Cooperative Research No. E-008)

Jacob W. Getzels

and

Mihaly Csikszentmihalyi

The University of Chicago

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AN EXPLORATORY STUDY

Cooperative Research Project No. E-008

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J.W.G.

M.C.

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CHAPTER I

THE PROBLEM

Education is witnessing a surge of interest in creative thinking. But it is a one-sided interest, virtually all the attention being focused on the sciences. Established scientists are studied for personality concomitants of achievement, and children are studied for their scientific potential. Almost no systematic work has been done in the humanities and the arts, or with students committed to a specific career in the arts as against the sciences, and actively preparing for such a career.

The present research and development project was placed within this latter domain, where current effort seems to be lagging and needs to be developed. Our most general purpose was to explore various aspects of creative thinking as related to education in the arts, the aim being to demonstrate the need, value and possibility of systematic inquiry in this area.

The work to be reported entailed three separate but interdependent phases. First, we took a bibliographic inventory of research concepts and methods in this area; second, we tested a number of the concepts and methods in an empirical study of the thought processes and personality structure of art students; and third, on the basis of the bibliographic and empirical analysis, we attempted to formulate a number of issues, concepts, and techniques capable of stimulating and guiding further systematic inquiry. Since this was a one-year research and development project rather than a long-term program of empirical investigation, we were more interested in discovering significant problems that might be pursued in greater detail later than in dealing with any already-discovered problem to an immediate conclusion.

Impetus to research in a new field may be given by one or more of the following circumstances: (1) The formulation of a powerful conceptual scheme from which significant hypotheses for empirical test may be derived--e.g., Hullian learning theory. This we do not now have in the area of our interest. (2) The discovery of an instrument or technique of demonstrated applicability and power--e.g., the electroencephalogram. This we do not have either. (3) The availability for study of a group of subjects having the experimental characteristics in which we are interested--e.g., Goldstein's brain-injured patients, Hollingworth's genius children.

It is within this latter context that we began our explorations. We were fortunate in having at our disposal for intensive testing and observation a group of subjects actively engaged in preparing for a career in the arts--a group which had exhibited strong motivation and ability for creative achievement, and had been selected by prominent artist-educators for training at one of the outstanding college-level museum-connected art schools in the country. It seemed to us that this was a unique opportunity not only for gaining insight into the character of creative workers and the nature of the creative process but for trying out concepts and methods, and thereby possibly contributing to the first and second conditions mentioned above needed for systematic research in the field.

Background: Some Questions of Definition

A general survey of the recent literature dealing with the relevant aspects of creativity, and more specifically with creativity in the arts, is included in Appendix A. In this survey and in the cross-indexed bibliography of some 150 items included in Appendix B, we review and discuss at some length five major issues in this area:

1. Cognitive processes.--Selected recent theoretical and empirical work on the thought processes of artists is reviewed, especially with respect to the presumed similarities and differences in creative thinking in the arts and the sciences.

2. Perceptual processes.--The literature dealing with the role of perception in artistic creativity, and more especially with the question of the artist's preference for complex visual patterns, is discussed.

3. Early experiences.--Included are studies reporting on the family antecedents of artists, their relationship with peers, and their adjustment to the educational system.

4. Socio-cultural environment.--Here we review work on the artist's position in society and his reactions to the cultural environment.

5. The motivations of the artist.--We review a number of representative currents of thought with respect to this very complex issue, especially ego-psychological, psychoanalytic, and existentially-oriented theories. Heuristic formulations from other disciplines (philosophy, physiology, etc.) are also examined.

In this section we want to comment briefly by way of background on the problem of defining creativity. The historic usage of the term can be grouped in three broad categories.

1. Creativity as original production

One approach is to focus on "creativity as the ability to produce along new and unconventional lines." This is the standard, or Webster, definition of the concept. In this sense, a person is called creative if he has brought into existence something new. The nature of the product defines the nature of the producer and the nature of his thought process. In practice, however, it is not enough that the product be "new" or "original" to be called creative. An unusual crime is "original," but it is hardly creative in the usual meaning of the term. Originality must be supplemented by the requirement that the product be of social value, that is, of use to others besides its author. MacKinnon (1962) summarizes the necessary criteria as: (1) there must be a novel or statistically infrequent response or idea, (2) the response or idea must be adaptive (3) there must be sustainment of the idea to fruition.

To conceive of creativity as the ability to produce something new seems self-evident. But this simple and apparently satisfactory definition raises a number of questions. For instance, would we consider Newton creative if he had failed to write the Principia? It is doubtful whether on the basis of his other work, with the possible exception of the Opticks, would we have known about his mathematical and deductive powers (Burtt, 1954). Yet it seems probable that without the prodding of Hooke, then co-secretary of the Royal Society, and a forced seclusion in the country to avoid the plague, Newton might not have produced the work by which his genius is measured.

It is then possible that but for the confluence of Hooke and the plague, not to mention the "giants' shoulders" on which he stood, we might know of Newton only as an obscure scholar who spent most of his life studying biblical prophecy. But now we would have to assume that he was a "creative thinker," whether or not events had so come together to facilitate or prohibit the actual writing of the Principia. As Gray put it, "Many a flower is born to blush unseen. . . ."

All this points to the possibility--at least as a possibility--that the man who produces a great creative work may differ from one who has never produced anything not only in that he possesses more "creativity" but that because of "accidental" circumstances he is in the right place at the right time. To rely then on products alone as the criterion of creativity may blind us to the existence of individuals with creative potential--Gray's "mute Miltons"--who for one reason or another may not have had the opportunity of being in the right place at the right time.

There is yet another difficulty with the apparently self-evident product or achievement criterion of creativity. How is one to measure the product or achievement? In a study of creative chemists and engineers, for example, Meer and Stein (1955) tried to use supervisory ratings of output, only to find that the ratings were much influenced by the subject's education, personality, and social behavior. In research with art students, teachers' ratings are often used --and quite reasonably. But Holland (1959) has shown that such ratings seem to depend very heavily on the academic achievement of the students and correlate with little else.

In perhaps the most careful study using products as the criterion of creativity, Ann Roe in 1946 differentiated among artists on the basis of the number of times they had exhibited their work, the number of prizes they had won, and other such objective indices of eminence (and presumably creativity). In 1951 in a study of scientists, she used ratings by colleagues in the National Academy of Science, and many variants of this latter method have been used by others (e.g., MacKinnon, 1962). Even here, however, legitimate objection may be raised that prizes and exhibits do not indicate the creativeness of the artist--the Impressionists were not accepted for exhibition by their more prestigious but now unknown contemporaries--and membership in learned societies or contemporary reputation in a profession may also be dubious indices of creativeness--would Galileo have been chosen as a creative person or as a heretic in his day?

Within this same achievement-oriented criterion, attempts have been made to avoid judgments of products or ratings by peers. For example, Zaccaria et al. (1956) used as a measure of creativity the activities mentioned by Air Force cadets in biographical inventories they had filled out, some activities being held more "creative" than others. This measure correlated significantly with eleven of the fifteen Guilford divergent thinking tests that were administered. However, one year later in a similar design, Chorness and Nottlemann (1957) used as a criterion of creativity of Air Force civilian employees the number of awards received for new ideas submitted, an apparently reasonable way of assessing creativeness in the given population, but no significant relationship to the Guilford tests was found. The use of personal activities or innovative industrial suggestions as criteria of creativity raises the issue whether these kinds of observation have any relationship whatsoever to the kinds of creativity we associate with a Leonardo or a Newton--indeed, whether they are even by the widest stretch on the same continuum.

In summary, creativity as the "ability to produce along new and unconventional lines" has been measured in a number of ways. One way is to use ratings of supervisors or teachers or others presumed to have knowledge of the subject's production. If this criterion is to have any value, more attention must be devoted to the competence of the raters. Although great pains are currently taken to show high reliability between raters, what is actually being rated so reliably is too often modestly passed over. There are in fact studies indicating that what was nominally being rated as "creativity," was actually a pattern of education, personality, and social behavior. A second way is to collect biographical information about a subject and judge the "creativity" of his activities. The difficulty with this measure is that there is little evidence these personal activities--say, of Air Force officers--have anything in common with creativity as defined by the work of a man of genius. A third way is to measure the actual success of the subject in a field like science or art where presumably creativity is required for success. Objective indices like number of prizes won, exhibits held, memberships in selective professional organizations are applied. This surely has a reassuring face validity, and may very well be the "least bad" of the available possibilities. But even so, there are severe difficulties. If only the product is the criterion, what about the person who though potentially creative, does not have the opportunity to produce? To paraphrase Cattell's remark, "Had the infant Newton been cast away among the Hottentots, would he still have announced the Laws of Motion?" Moreover, this aside, legitimate objection may be raised that prizes, exhibits, professional memberships may be a function of shrewdness, politics, and persistence --indeed, of conformity itself--rather than of bold creativity.

2. Creativity as a cognitive problem-solving process

A second general approach to establishing criteria of creativity is in terms of "creativity as a cognitive or problem-solving process." Studies in this context are generally done through the mediation of some kind of test presumably measuring a cognitive process said to underlie creative achievement, somewhat in the way intelligence as measured by an intelligence test is said to underlie school achievement.

It is J. P. Guilford, who more than any other person has worked within this framework and described the kinds of cognitive processes that might account for creative products. Among the 120 cells comprising "the structure of intellect" in his system, there are a number of factors said to be characteristic of creative people. Tests of various kinds of "divergent thinking" representing these mental processes have been constructed and are widely used in studies of creativity. In this respect, Guilford's achievement is beyond question. There is no doubt that these tests do measure more or less unique and previously unidentified mental processes which are of interest in their own right. They may also be characteristic of creative people. In this sense, the question asked by Brittain and Beittel (1961), and echoed by others, i.e., whether it is in fact not more important to study the process of creativity rather than the product is very much to the point. It is a refreshing alternative, since as we have seen the use of products as a criterion of creativity, though apparently simple, may be quite deceptive.

This is not to say that there are not also serious difficulties with the process-approach, at least as represented by tests. It has not yet been established that individuals known to be creative on other grounds do indeed perform better on these instruments. Among those who did not find the anticipated relationships between tests and other measures of creativity are Bloom (1955) with scientists, Cherness and Nottlemann (1956, 1957) with Air Force personnel, and Brittain and Beittel (1961) with artists. Moreover, there is the danger that by concentrating on variables measured by tests, one may take as a criterion of a complex changing and developing process something structured and unidimensional like a test score. Thus Maltzman (1959), who has done a number of fruitful studies in originality, trained students to free associate and found that they performed better on Guilford's Unusual Uses test. On the basis of this, he concluded that "originality is a form of learned behavior following the same principles of other forms of operant behavior."

It would seem that originality, at least in its usual meaning, is a rather large concept to be equated with a score on a single test. Is the "originality" so measured related to any other form of original thought? The point of course is not that Unusual Uses is not measuring a unique and significant mental function. It is rather that its relationship to non-test original performance is unknown. To be sure, Maltzman (1960) may argue, ". . . it should be noted that the term 'originality' as employed [here] refers to a particular kind of behavior measured by a specific operation under given conditions. If it is objected that this is not genuine originality, then it should be incumbent upon the critic to specify the latter behavior in equally operational terms so that it too may be subjected to experimental study." But this evasion--if evasion it is--still leaves the salient and fertile question unanswered: Should there be no relationship between creativity as defined by this criterion and creativity as defined by that criterion?

Finally, one other issue has been raised with respect to tests of creativity that ought to be mentioned here, however briefly. Unlike other forms of mental functioning--say, memory--creativity by its very nature cannot be measured by reference to some already existing norms. A given experimental or test situation is not a miniature work-sample or replica of a creative situation. Most descriptions of the truly creative process agree with Dewey's in placing the source of the process in "a feeling of unease or dissatisfaction" with the status quo in a particular area, and it is doubtful whether the motivation for change, which is at the root of the creative process, can be fully awakened by mental tests. Indeed, it may be argued that the creative person, whose thought processes are triggered by a subjectively meaningful problem, will perform less well on such tests than will an intellectually flexible though not deeply creative person. The argument is not that creativity tests are not a fruitful subject for research in their own right and, as we have said, that they may not be related to some kinds of creative thought processes. Rather the argument is that what is needed is clear confirmation that the mental processes involved in solving the tasks presented by these tests are also involved in the creative act--an act that results in a new synthesis of experience meaningful to its author and to others.

3. Creativity as subjective experience

The third usage of the concept of creativity to which we wish to call attention is as "subjective experience." This is a view in which experimentalists have for obvious reasons not been interested, but one which perhaps for exactly the same reasons is quite attractive to humanists and clinical psychologists. For them, the creative process cannot be caught by a test or measured by a product. Maslow (1963), for example, is interested in the "creative insight" (the "flash of genius") without reference to whether it will ever result in anything tangible. The important issue is the "inspired moment" itself, not the "inspired product." To translate the "inspiration" into a creative product only such factors irrelevant to the "creative" as opposed to the "productive" process are needed as training, perseverence, and hard work. Maslow insists that creativity is in the imagination, not in the achievement. To the question posed by Sartre (1956), "Is the genius of Proust to be found in his books, or are his books only accidental manifestations of his genius?", Maslow would resoundingly reply that genius is to be found in the person.

Givens (1962) defines creativity as "a uniquely human mental ability wherein an individual conceives a synthesis of ideas which is original for him, searches for deep meanings of the ideas, and seeks to find either their correspondence with reality or their relation to the thoughts of others." Maslow and others like him are interested in creativeness because this conceiving a synthesis of ideas with its attendant experiences is enriching for man's inner life, regardless of any consequent objective outcome. For them, the ultimate significance of creativity lies in its subjective experience. They discount the simple equation of creativity and novel production. And they do not attach importance to the pattern of the apparent problem-solving processes used to attain the creative insight--if indeed the problem-solving process as it is conceived by the experimentalists has anything to do with it at all, which they hold to be doubtful. More than this, theorists of this persuasion make a sharp distinction between the problem-solving of science and true creativeness. To cite a passage from Maslow (1963) bristling with apparent heresy, "I could . . . define science as a technique, social and institutionalized, whereby even unintelligent people can be useful in the advance of knowledge. . . . Therefore, when he [the scientist] discovers something, I have learned to understand this as a product of a social institution, of a collaboration."

Although Maslow singles out science as resting heavily upon perspiration and tradition rather than inspiration, it seems the same argument may also be applied, with only slight modification, to art. And perhaps despite Maslow's strictures to the contrary, immediate inspiration in the arts as well as in the sciences may be founded in preceding perspiration. At least in this sense the creativity of the artist and of the scientist is perhaps not so opposed as Maslow would make it. Even the greatest innovators in the arts relied heavily on the work of their predecessors. Picasso is supposed to have said, "The artist who does not copy the old masters spends his life copying himself"--a statement suggesting that one is not able to create unless he has assimilated the genius of others. A good example of this is Picasso's own concern with the past in his series of paintings based on Delacroix' "Les Femmes d'Alger."

It would be interesting to explore at greater length than we are able to do here this subjective conception of creativity. Suffice it to say, the characteristics which differentiate this conception from the other points of view are that creativity need not result in any observable product--it can remain as subjective experience--and that it does not entail a specific measurable cognitive process--at least not by available methods. These characteristics make the concept very elusive, impregnable to objective examination, and consequently impossible of study by the usual canons of empirical inquiry. But the proponents of this view argue that because a phenomenon is not amenable to the "usual" canons of inquiry does not mean that it does not exist and is not real.

Consideration must be given to the possibility that the processes of creativity may not lie in the orderly attack on an issue according to the logical steps of "how to solve problems" but in a sudden inner experience of having made, as Oppenheimer (1955) saw it, "partial order in total chaos." The heuristic contribution of this view of creativity to systematic research in the area is that it calls attention to the need for more intensive observation of creative people. If the so-called flash of insight emerges from the very depths of human being and human experience, then deeper processes than those presumably involved in the usual types of problem-solving tasks must be sought for. Perhaps the unique value-and-meaning systems of creative people may be the most important material for exploration if we are to comprehend the nature of creativity in all its complexity.

One final comment regarding the problem of definition--whether it be creativity as product, as process, or as subjective experience. For the sake of simplicity we have dealt with creativity as a unitary function or single factor. Many who work in the field assume this unidimensionality to be in fact the case, and the same kinds of cognitive process are invoked for creativity in different fields of endeavor. The same tests are applied to third grade children, Air Force officers, scientists, and art students; and results from one population are generalized to another.

Lately, a number of studies have departed from this monolithic approach, at least where personality correlates of creativity are concerned. Thus Rees and Goldman (1961) conclude that it would be more fruitful to consider such individual characteristics as introversion, bisexuality, inability to conform to cultural standards, etc. as relevant only to a particular field of creativity, say, artistic creativity.

From this point of view, a businessman deemed creative might differ in very significant respects both personalistically and cognitively from a sculptor, who might himself differ very significantly from a poet. Even if we accept the very simple definition of creativity used by the Art School where we did the study, i.e., the "ability to initiate ideas and draw on personal resources," which might hold broadly for both businessmen and artists alike, the substantive nature of the ideas to be initiated would be very different. Not only might the products of the two groups differ mightily but also the underlying cognitive processes and subjective experiences. And what is true of businessmen and artists may also be true of fine artists and applied artists, of commercial artists and industrial artists. In short, it may be that a significant fallacy in definition and in the empirical work in this area has been the adherence to an undifferentiated concept of creativity, the use of undifferentiated subjects for study, and the failure to investigate possible differences among and within groups of creative subjects.

Issues for Empirical Investigation and Outline of the Report

As already indicated, the study included bibliographical, theoretical, and empirical objectives. In the present section we want to suggest the nature of the empirical issues, and to provide a brief outline of the report as a whole.

There were four categories of issues to which we addressed ourselves:

1. Issues dealing with the comparison of our subjects with relevant age, sex, and education norms. Among the specific questions posed for investigation were: Are art students more intelligent or less intelligent than the average college students of the same age and sex? Do they perform better on "divergent thinking" tests? Do they differ from the appropriate normative groups in value-orientations? In personality structure?

2. Issues dealing with the comparison among sub-groups within the general group of art students. In preceding investigations, students specializing in fine art, commercial art, art education, and so on have all been grouped together under the generic designation "art student." But clearly fine artists may differ as sharply from, say, commercial artists as the generic "art student" may from the generic "college student." Moreover, despite the historic differences between males and females in relation to achievement in the arts--there is, for example, no truly great female artist, although there are great female novelists--sex differences have not been considered an important variable in the investigation

of art students. Accordingly, among our specific empirical questions were: What is the relationship of cognition, perception, value-orientation, and personality structure to the choice of field of specialization in art school? What is the relationship between male and female students with respect to these variables? What, for example, are the economic or aesthetic values of fine art students as compared with those of applied arts students? What are the perceptual skills of female art students as compared with those of male art students?

3. Issues dealing with the criterion of creativity itself. Since there are a number of apparently equally applicable criteria of creativity currently in use, the question arose: How are these current measures of creativity related to each other? Would, for example, a factorial and correlational analysis yield a unitary cluster of cognitive, perceptual, personalistic, and achievement characteristics? Or are the several indices, all presumably measuring creativity, discrete and uncorrelated?

4. Issues dealing with differences, if any, between high achieving and low achieving fine arts students. The specific questions here were: What are the distinguishing characteristics of the fine artists as a group from other art groups? Within the fine arts group, in what respects do the high achieving students differ from the low achieving students? What are the working strategies of representative students from the two sub-groups?

The following chapter--Chapter II--describes the locus of the study, the subjects, the instruments, and the procedures. The ensuing four Chapters present the results with regard to each of the categories of issues described above. Chapter III presents the comparison of the total art group with the appropriate age, sex, and education norms; Chapter IV presents the comparison of the various sub-groups of students within the total art group. Chapter V presents a factorial analysis of a number of the most frequently used criteria of creativity. Chapter VI presents the results of the intensive investigation of the high and low achieving fine arts students, and includes examples of their working strategies. In the final chapter--Chapter VII--we review the salient findings and attempt to formulate a number of conceptual and methodological issues for further work in the area.

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CHAPTER II

PROCEDURES

1. Locus of the study

All subjects for the present study are full-time day students at a museum-connected, degree-granting art school. The School is a branch of its parent Museum; and its students have immediate access to the rich possessions and modern facilities of this great institution. The School is equipped to grant BFA and MFA degrees. In addition to the specialized art courses taught by prominent professional artists, students are required to take a number of humanities and social science courses at a neighboring university.

It could be said that on the one hand the School is at least as rigorous academically as the majority of colleges are, while on the other it maintains a flexibility of requirements, schedules, and commitments that permits each student to find and pursue his individual goal.

The student body is quite cosmopolitan; every year students apply and arrive from as far away as Japan, Iran, and Scandinavia. Students exhibit their work frequently in and outside the School. In a recent well-publicized national "show" five students exhibited, and one won third prize in the invitational section, in competition with dozens of recognized professional artists. It is not unusual for an advanced student to have signed a contract with an art gallery and to support himself, at least partially, from the proceeds of his art-work.

The School is then truly both an academic institution of higher learning and a complex of studios where the students can gradually pass from apprenticeship to professional production in their field. Because of the characteristics outlined above and its size (it is the largest institution of its kind in the world), the School offers an unmatched opportunity for studying a group of future artists.

Recently it has become fashionable to think that an art school is not the place to look for future artists. The emphasis on individual expression in modern art generates, as a corollary, the belief that art students who attend an art school must lack confidence in themselves since they prefer to learn their skills in a structured environment rather than to develop these skills individually. But if one considers the development of the artist in historical perspective, it becomes obvious that almost every known artist spent an extended period of apprenticeship before he could develop his own style and produce independently. Because of the social changes that have taken place between the Renaissance and the present, it is practically impossible for a young artist to become an apprentice with a master (except in cases such as Picasso and Wyeth, whose fathers also had been painters). Therefore, art schools are now about the only place a young artist can go for the necessary novitiate in his profession. While intuitive self-expression is currently an accepted form of art, it is safe to expect that in the long run the contribution of artists who have attended art school may be no less than that of those who have not. These were the general considerations that led us to conclude that the students at this Art School would provide a fruitful sample in which to investigate processes of creativity.

2. The Sample

The population suited for our purposes included all the second and third year students in the School during the Spring of 1963. Fourth year students were excluded because many of them expected to leave the School after graduation, thus precluding an extended study. Freshmen were not considered because few of the students decide in their first year which field of art they want to specialize in, and are, in general, less committed to a career in the arts than students in the upper grades. There were 321 full-time students registered in the second and third year, and we proposed to collect data on as many of them as possible.

The two main difficulties that were anticipated in this were that we had to collect the data just before the final exams were due, and that art students are notoriously wary of infringements on their privacy. Since it was thought best not to make attendance at the testing sessions compulsory, a certain loss in subjects was anticipated. As it turned out, the loss was much smaller than expected. The majority of students who absented themselves alleged excuses that had to do with preparation for the finals; only a dozen or so refused to participate on principle.

Threee sessions, each two hours long, were needed to complete the testing. Table 2.01 reports the number of subjects who took each of the three test batteries: 82 per cent of all students took the first battery, and 56 per cent completed all three. For most purposes of this study, only the "core sample" of 179 cases for whom complete data are available will be used. As is apparent from the analysis given in Appendices D.01 and .02, this group of 179 subjects does not differ on any of the variables from the larger group of students. For all practical purposes, the "core sample" can be considered a representative sample of the student body under study.

Table 2.01 shows that there were approximately equal numbers of male and female, sophomore and junior students in the core sample.

TABLE 2.01

SAMPLE DISTRIBUTION

	Registered as of June 1963 (Population)	Took Battery:			Took All 3 Batteries "Core Sample"	
		No. 1	No. 2	No. 3	N	Percentage of Population
Junior						
Males	94	73	54	50	44	47
Females	81	69	60	59	48	59
Sophomore						
Males	75	57	45	46	42	56
Females	71	67	53	55	45	64
Total	321	266	212	210	179	56

The greatest loss of subjects occurred in the male third-year group, while the second-year females were the most assiduous. Further descriptive data are given in Tables 2.02 - 2.11. These tables summarize information from the questionnaire included in the first battery, and are therefore based on N = 266.

For the purposes of the study, subjects were divided into four "majors." The four-fold division is a regrouping of the nine fields of specialization actually recognized by the School. The Fine Arts group includes students majoring in: a) drawing, painting, and printmaking; b) sculpture and architectural sculpture. The Industrial Arts group includes students majoring in: a) ceramics, b) dress design, c) flat pattern and weaving, d) industrial design, e) interior design. The other two groups in this study--Advertising Design and Art Education--correspond to the homonymous majors recognized by the School. As indicated in Table 2.02, the majority of students are registered in the Fine Arts program, which reflects the non-commercial orientation of the School. The only slight sex difference is in the number of Advertising majors, there being almost three times as many males as females in this field. Another meaningful way of dividing the sample is by combining the Advertising and Industrial Arts majors into a large Applied Arts group, to be contrasted with the Fine Arts students. This is a division which will be used instead of the four-fold one, when simplification is needed.

As Table 2.03 indicates, the majority of students did not enroll in the School directly upon completion of high school. Almost 10 per cent completed college elsewhere, and 43 per cent had some college experience prior to entering the Art School. This accounts partly for the relatively advanced age of the students--the average age of male students is 22.78 years (SD: 4.70), and of female students 23.71 (SD: 6.92).

TABLE 2.02

FIELD OF SPECIALIZATION

	Males		Females		Total	
	N	%	N	%	N	%
Fine Arts	60	46.1	68	50.0	128	48.1
Art Education	14	10.8	20	14.7	34	12.8
Advertising	27	20.8	10	7.4	37	13.9
Industrial Arts	29	22.3	38	27.9	67	25.2
Total	130	100.0	136	100.0	266	100.0

TABLE 2.03

PREVIOUS EDUCATION

	Males		Females		Total	
	N	%	N	%	N	%
Completed high school	62	47.7	64	47.1	126	47.4
Some college	57	43.8	58	42.6	115	43.2
Completed college	8	6.2	11	8.1	19	7.1
Postgraduate study	3	2.3	3	2.2	6	2.3
Total	130	100.0	136	100.0	266	100.0

As Table 2.04 indicates, about one-fourth of the sample is either first generation American or foreign born.

The social class background of the students is quite varied (Table 2.05). All social and economic strata are well represented. The one sex difference which seems meaningful is the one apparent in Table 2.05C. Significantly more of the female students' fathers went on to study after high school than did fathers of male students (Chi-square 7.7, p = .02).

TABLE 2.04

NATIONAL ORIGIN

	Males		Females		Total	
	N	%	N	%	N	%
Self, both parents U.S. born	99	76.2	101	74.3	200	75.2
One parent foreign born	12	9.2	17	12.5	29	10.9
Both parents foreign born	10	7.7	7	5.1	17	6.4
Self, both parents foreign born	9	6.9	11	8.1	20	7.5
Total	130	100.0	136	100.0	266	100.0

TABLE 2.05

FATHER'S OCCUPATION, INCOME, AND EDUCATION

	Males		Females		Total	
	N	%	N	%	N	%
A. Father's Occupation						
Worker (unskilled, blue collar)	11	8.5	4	2.9	15	5.6
Worker (skilled, blue collar)	31	23.9	32	23.5	63	23.7
Farmer	5	3.8	6	4.4	11	4.1
Worker (white collar) .	33	25.4	22	16.2	55	20.7
Junior executive . . .	9	6.9	9	6.6	18	6.8
Major executive	7	5.4	10	7.4	17	6.4
Small business	13	10.0	20	14.7	33	12.4
Large business	5	3.8	6	4.4	11	4.1
Professional	16	12.3	27	19.9	43	16.2
Total	130	100.0	136	100.0	266	100.0
B. Parents' Income						
Less than $5,000 . . .	19	14.7	18	13.2	37	14.0
$ 5,000 - $ 7,500 . .	39	30.2	30	22.1	69	26.0
7,500 - 10,000 . .	31	24.1	45	33.1	76	28.7
10,000 - 15,000 . .	27	20.9	22	16.2	49	18.5
15,000 - over . . .	13	10.1	21	15.4	34	12.8
Total	129	100.0	136	100.0	265	100.0

TABLE 2.05--Continued

	Males		Females		Total	
	N	%	N	%	N	%
C. Father's Education						
Less than high school .	22	17.1	18	13.2	40	15.1
Some high school . . .	20	15.5	20	14.7	40	15.1
Completed high school .	39	30.2	23	16.9	62	23.4
Some college	27	20.9	37	27.3	64	24.2
Completed college . . .	13	10.1	26	19.1	39	14.7
Post-graduate study . .	8	6.2	12	8.8	20	7.5
Total	129	100.0	136	100.0	265	100.0

Information about the marital status and the religion of the parents is included in Table 2.06. Few students come from families that are broken by either separation or death of parents; a slightly larger number belong to families of divided faith.

TABLE 2.06

MARITAL STATUS AND RELIGION OF PARENTS

	Males		Females		Total	
	N	%	N	%	N	%
A. Parents' Marital Status						
Parents living together	109	84.5	131	96.3	240	90.6
Separated	8	6.2	1	.7	9	3.4
Divorced	12	9.3	4	3.0	16	6.0
Total	129	100.0	136	100.0	265	100.0

TABLE 2.06--Continued

	Males		Females		Total	
	N	%	N	%	N	%
B. Parents' Religion						
Both parents belong to same religion as subject	84	65.1	95	69.8	179	67.6
One parent belongs to different religion .	18	14.0	25	18.4	43	16.2
Both parents belong to different religion .	27	20.9	16	11.8	43	16.2
Total	129	100.0	136	100.0	265	100.0

Table 2.07 presents data regarding the family size of our subjects.

TABLE 2.07

NUMBER OF SIBLINGS

	Males		Females		Total	
	N	%	N	%	N	%
Only child	16	12.4	21	15.5	37	14.0
One sibling	49	37.9	56	41.5	105	39.8
Two siblings	34	26.4	36	26.7	70	26.5
Three siblings	15	11.6	13	9.6	28	10.6
Four siblings	5	3.9	5	3.7	10	3.8
Five siblings	5	3.9	4	3.0	9	3.4
Six siblings	2	1.6	0	0	2	.8
Seven siblings	3	2.3	0	0	3	1.1
Total	129	100.0	135	100.0	264	100.0

Among religions professed by the students, the Catholic and Jewish faiths are well represented, while a sizeable group declines to state any religious affiliation (Table 2.08). Slightly less than half of the student body reports at least monthly church attendance.

TABLE 2.08

RELIGIOUS PREFERENCE AND CHURCH ATTENDANCE

	Males		Females		Total	
	N	%	N	%	N	%
A. Religion						
Protestant	50	38.7	53	39.6	103	39.2
Catholic	34	26.4	33	24.6	67	25.5
Jewish	13	10.1	21	15.7	34	12.9
Other	4	3.1	9	6.7	13	4.9
None	28	21.7	18	13.4	46	17.5
Total	129	100.0	134	100.0	263	100.0
B. Attendance						
Attends worship at least once a month	60	46.5	55	41.0	115	43.6
Does not attend worship at least once a month.	69	53.5	79	59.0	148	56.3
Total	129	100.0	134	100.0	263	100.0

As Table 2.09 shows, the majority of students seem to have begun thinking seriously about art as a career between the ages of 14 and 19 years. About 26 per cent of the females claim to have considered art as a career before they were nine years old, while the corresponding percentage for the males is 10 per cent. Conversely, about 20 per cent of the males and only 6 per cent of the females reported that they started thinking seriously about art after age 20.

The age at which art work began to be produced independently of school requirements is also quite variable. A full one-quarter of the sample stated they had begun doing art work on their own before grade four, but about 12 per cent claimed never to have done any art work except as required in class. The data are given in Table 2.10.

TABLE 2.09

AGE AT WHICH CAREER IN ART WAS FIRST CONSIDERED

	Males		Females		Total	
	N	%	N	%	N	%
Still uncommitted	0	0	1	.7	1	.4
Less than 8 years old . .	7	5.4	23	17.2	30	11.4
8-9 years old	6	4.7	12	8.9	18	6.8
10-11 years old	12	9.3	8	6.0	20	7.6
12-13 years old	14	10.8	16	11.9	30	11.4
14-15 years old	23	17.8	23	17.2	46	17.5
16-17 years old	21	16.3	21	15.7	42	16.0
18-19 years old	20	15.5	22	16.4	42	16.0
20-21 years old	10	7.8	2	1.5	12	4.5
More than 21 years old .	16	12.4	6	4.5	22	8.4
Total	129	100.0	134	100.0	263	100.0

TABLE 2.10

AGE AT WHICH SUBJECT BEGAN TO PRODUCE ART WORK

	Males		Females		Total	
	N	%	N	%	N	%
Before grade 2	1	.8	1	.8	2	.8
Before grade 4	31	24.0	37	27.6	68	25.9
Before grade 6	26	20.2	26	19.4	52	19.8
Before grade 8	15	11.6	19	14.2	34	12.9
Before sophomore class in high school	16	12.4	18	13.4	34	12.9
Before graduating from high school	14	10.8	11	8.2	25	9.5
After high school . . .	10	7.8	5	3.7	15	5.7
Never did art work except as school assignment	16	12.4	17	12.7	33	12.5
Total	129	100.0	134	100.0	263	100.0

Finally, Table 2.11 summarizes the reported distribution of scholarships and exhibitions of works. About two-thirds of the students in the sample report having received at least one scholarship in art during their academic career, or having had a "show" of their work outside the School.

TABLE 2.11

EXHIBITS-SCHOLARSHIPS

No. of exhibits or scholarships received in art:	Males		Females		Total	
	N	%	N	%	N	%
0	37	28.7	40	29.8	77	29.3
1	39	30.2	35	26.1	74	28.1
2	27	20.9	19	14.2	46	17.4
3	14	10.8	18	13.4	32	12.2
4	3	2.3	8	6.0	11	4.2
5	3	2.3	6	4.5	9	3.4
6	2	1.6	5	3.7	7	2.7
7	2	1.6	2	1.5	4	1.5
8	1	.8	1	.8	2	.8
9	1	.8	0	0	1	.4
Total	129	100.0	134	100.0	263	100.0

It is hard to establish how unique our sample is on the descriptive variables summarized above. Normative data on college students in general do exist for some of the variables, but in this context it was not deemed particularly useful to compare our sample with the norms on such descriptive characteristics.

One generalization that seems warranted from Tables 2.09 to 2.11 is that the students under consideration became involved with art quite early. The opportunity to gain recognition through scholarships and exhibitions of work, particularly in the critical years between 14 and 19, appears to have committed these students quite seriously to a career in the arts. To be able to show one's work, and have it seriously evaluated at such an early age is an encouragement that adolescents interested in other fields rarely experience, and this may be one of the reasons why the art students in our sample show such a strong and pervasive commitment to their future career.

3. Instruments

The instruments were selected with the aim of providing information on as many crucial areas related to theories of creativity as possible. Since the sample consisted of art students, five general areas of investigation were considered: cognitive processes, perceptual processes, personalistic attributes, ratings in originality and creative potential, and achievement in art courses. Instruments were selected to provide data relevant to each of the areas, and are listed below according to our *a priori* notion of what they were measuring, based on the reports in the literature. In subsequent sections they will be regrouped according to the pattern of relationships which emerged from factor analyses.

Cognitive tests

In addition to the usual instruments measuring general intelligence, we proposed to select cognitive tests which would measure the theoretically independent processes of "divergent" and "convergent" thinking as proposed by Guilford. In view of previous theories and empirical observations, it was expected that performance on "divergent" tests would correlate more than that on "convergent" tests with appropriate criteria of creative achievement in the Art School. The instruments finally used were selected on the basis of at least three considerations: their relevance to the study of creativity in art students; their proven fruitfulness in previous research; their ease of administration in a group situation.

a) *Wonderlic Personnel Test, Form I*.--A 12-minute speed test, this is a measure of intelligence which can be converted into Otis Test of Higher Mental Abilities scores; it is described, among other places, in the *Wonderlic Personnel Test Manual* (1961). Scoring objective.[1]

b) *16 Personality Factors, Form A, Factor B*.--This is a power test of "general intelligence," included in the 16 PF Personality battery. Described in Cattell (1962). Scoring objective.

c) *Unusual Uses*.--Performance on this test is said to measure "divergent spontaneous flexibility." It is described in Guilford (1951), and was scored according to the 1963 scoring guide. Scoring reliability was computed between two raters (N=20) by rank-order correlation; *rho* = .951.

d) *Brick Uses*.--Believed to measure "divergent semantic fluidity" and "flexibility." Described in Guilford (1951). In our study only 5 minutes were given for the completion of this test instead of the usual 10. Scored according to the 1962 guide. Reliability between two raters, N=20, rank-order: Fluency, *rho* = 1.00; Flexibility, *rho* = .877.

e) *Thing Categories (Ideational Fluency)*.--A measure of "divergent semantic fluency." Included in several test batteries by other authors, it was used by Guilford (1960) to measure ideational fluency. No scoring guide was available for this test. The instructions are:

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[1] For published tests which are scored objectively, scoring reliability was not computed.

> List the names of things that are round or
> that could be called round.

In this study, responses giving such objects as "cigar" or "pencil"--that is, primarily cylindrical objects--were not counted. Also, objects which could be round, but are not usually so, were disregarded, such as "letter," "painting," "hams," etc. Accepted responses included circular or spherical objects, i.e.: "wheels," "bosoms," "fish-eggs," "some heads," "buttons," etc. Reliability between two scorers, N=20, rho = .962.

f) Object-Question Test.--This instrument, described in a manual by R. C. Burkhart and G. Bernheim (1963), has been found to measure divergent evaluative questioning power. The test instructs subjects to ask as many questions as possible about six objects. The responses are scored according to how divergent and personal the resulting questions are. For this study, the scoring of the manual was slightly modified. Each question was awarded a score between 0 and 4. The highest score (4) was given to questions judged to be both Divergent and Personal (e.g.: "Do paper clips have any feelings knowing they're just paper clips?"). Three points were given to Divergent Factual questions (e.g.: "Could people live on grass for breakfast?"). Two points were given for Complex Personal questions (e.g.: "What is it about ice trucks that fascinates children?"). Finally, one point was given to Simple Personal questions (e.g.: "Is the color of grass why cows enjoy it?"). Complex Factual and Simple Factual questions were not given any points. Examples of the two latter types of questions are "How does the sea move the sea shell?" (Complex Factual) and "By what authority is the biological classification of the living shells correct?" (Simple Factual). Scoring reliability for the test was established between two judges, on four samples of 20 subjects each. Rank order correlations thus obtained ranged from .851 on the first 20 cases to .906 on the last 20. Percentage agreement between two raters on placement in a specific category ranged from 50 per cent (Divergent Personal) to 78 per cent (Complex Factual). Average agreement was 68 per cent.

g) Word-Association Test.--A similar test was included in the "divergent" category by Guilford (1960). This instrument was identical with the homonymous test used by Getzels and Jackson (1962). It can be scored for fluency and flexibility of associations. Rank-order rho, two raters, 20 cases = .992.

Perceptual Tests

It is very difficult to find group instruments which would measure purely perceptual aptitudes. Three of the tests which were expected to measure dimensions of perception are also known to measure cognitive aptitudes. The instruments finally selected were the following:

a) Hidden Shapes.--Part of the Objective-Analytic Test Battery by Cattell (1958). It supposedly measures "flexibility of closure," or "convergent figural transformations" (Guilford, 1960). In the present study, two minutes and 30 seconds were allowed for the completion of the test, since it had seemed to have a low ceiling for this population. Scoring objective.

b) Match Problems III.--A measure of "divergent figural transformations," used by Guilford (1960) to measure "figural adaptive flexibility." Instead of allowing the required 12 minutes for this test, 8-1/2 minutes were given for the completion of both its parts. This perhaps accounts for the unsatisfactory results obtained through this instrument. No reliability was computed, since the scoring is objective.

c) Spatial Visualization.--Part VI of the Guilford-Zimmermann Aptitude Survey (Manual, 1956). A measure of "cognitive figural transformations." Scoring objective.

d) Perceptual Memory.--This instrument was developed for the purposes of this study by M. Csikszentmihalyi (see Appendix C). It was expected to measure memory for perceptual content, structure, and detail. The subjects are shown two slides, each exposed for 40 seconds on a screen. Slide 1 is a design composed of geometrical shapes. Slide 2 is a line-drawing of a simple still life (adapted from a painting by Morandi). Following the first slide, the subjects are allowed three minutes to reproduce on a sheet of paper the design shown on the screen. Following the second slide, the subjects are allowed four minutes to reproduce the second design, and to mark the correct alternative from nine pairs of illustrations, where in each pair one illustration has a detail which was not present on the slide.

The scoring of the protocols is objective: number of errors in the content and the structure of the reproduced designs are counted. There are five partial error scores, and a total error score. For the comparisons in the present study, only the total error score was used. Reliability of scoring between two judges, on four samples of 20 cases each, ranged from .805 to .955, rank-order rho.

e) Welsh Figure Preference Test.--The Revised Art Scale of this instrument measures subjects' visual preference against that of recognized artists. Described in the Manual (1959). Scoring objective.

Personality Tests

From the numerous possible personality inventories and scales, six were selected which seemed on theoretical grounds most relevant to the personality of the artist, which could be administered in a group situation, and were worded so as not to antagonize a rather sophisticated group of subjects.

a) The Allport-Vernon-Lindzey Study of Values.--This measures the relative strength of six basic values which are thought to underlie a person's general orientation towards life. Described in the Manual (1960). Scoring objective.

b) Sixteen Personality Factors Questionnaire.--Developed by Cattell, the 16PF is an inventory which "covers planfully and precisely all the main dimensions along which people can differ" (Cattell, 1962). There are 16 traits measured, among which are ego-strength, sensitivity, self-sufficiency, etc. A combination of ten of the factors has also been used to measure "creative personality" (IPAT Bulletin #10, 1963). Scoring objective.

c) Sentence Completion.--This is a slightly modified version of a similar instrument used by Getzels and Jackson (1962). In the first battery, the test was worded in the third person (i.e., "When John was asked to be in charge, he . . ." or for girls, "When Mary was asked to be in charge, she . . ."). (See Appendix C.) In the third battery of tests, the same instrument was given again, this time worded in the first person (i.e., "When I am asked to be in charge, I . . ."). The number of negative responses was counted. Thirty out of the 50 items implied either a positive or negative completion, and the score was based on these 30 items. Completions were counted as negative when they expressed despair, boredom, aggression --in general, an "acting out" of unsocialized impulses. Three scores were derived: 1) Negative responses to third person; 2) Negative responses to first person; 3) Differences between 1 and 2. Scoring reliability between two raters, N=17, ranged between rho = .773 for the difference score to rho = .952 for the third person score. Percentage scoring agreement on single items ranged from 87 per cent (first person) to 93 per cent (third person).

d) Semantic Differential.--An instrument developed and used by Hess, Sims, and Henry (1963), it is based on Erikson's theory of Ego Identity, and is designed to measure identity diffusion. Scoring objective.

e) Thematic Apperception Test.--Group administration. Scored for novelty of productions. As with the usual TAT, the subjects are required to write stories to a picture which is shown to them. The administration and scoring procedures followed those used by Maddi et al. (1962). Four slides were shown on a screen for 20 seconds each, and four minutes were allotted following each picture for composing and writing the story. The stories were then scored for the unusual character of their plots, imagery, etc., and a total "novelty" score was obtained for each subject. Scoring reliability between two raters ranged from rho = .878 (N=18) to rho = .960 (N=15). The agreement in scoring the various categories ranged from 85 per cent to 94 per cent.

f) Association of Color.--Developed by M. Csikszentmihalyi and previously used with art students, this instrument involves associating one of six colors (represented by their names) with each of 50 stimulus sentences. (See Appendix C.) The test was expected to reflect a tendency to reject stereotypes. In this study, only the number of times a subject chose to write in a color of his own choice, instead of just checking one of the five colors provided, was scored. Scoring objective.

Ratings

Ratings on originality and artistic potential were already available in the files of the Art School, since it is the usual procedure for the teachers of the School to fill out a rating-sheet for each of the students at the end of each semester. These ratings become part of the permanent record of the students.

a) Creativity Rating I. (OAP-1).--Each student is rated by the teachers on 10 variables, including: reliability, working habits, common sense, originality, artistic potential, etc. For each variable the student is given a rating from 1 (very low) to 4 (very high). For purposes of this study only the ratings on Originality and Artistic Potential were used. Originality was defined by the teachers as follows: "Ability to originate ideas and to draw on personal resources in preparing assignments." Artistic Potential was defined as "Capacity for growth and development of innate talent in pursuit of positive professional success in chosen field." Taken together, these two statements are a good definition of creativity. One could compare this definition, for instance, to the three necessary conditions for creativity as listed by MacKinnon (1962): 1) There must be a novel or statistically infrequent response or idea; 2) The response or idea must be adaptive to reality; 3) There must be sustainment of the idea to fruition. The "Originality" rating meets the requirements of MacKinnon's first condition, and the last two requirements are covered by the "Artistic Potential" rating.

To obtain our "creativity rating" (OAP-1), the Originality ratings were averaged, and this average was added to the averaged Artistic Potential ratings. The new ratings therefore had a range from 2.0 to 8.0. The mean ratings on Originality correlated with the mean ratings on Artistic Potential between .72 (N-44 males) and .77 (N=33 females). OAP-1 refers to the rating obtained as outlined above, based on teachers' ratings given at the end of the students' first year in School.

b) Creativity Rating II. (OAP-2).--This rating was obtained in the same way as OAP-1, but was based on teachers' ratings given at the end of the students' second year.

There was a signal advantage in using the ratings already available in the School files. For they provided a more realistic and functional assessment of the students than could be obtained by any other means at our command. Ratings which are given not for some extraneous experimental purpose but for the student's permanent record are more likely to be considered seriously by the teachers, and in this functional sense at least, ratings of this kind are likely to be more "valid." The functional advantage was, however, accompanied by an experimental disadvantage: It became difficult to estimate the internal reliability of the several ratings. This was due to the circumstance that because of the high teacher-student ratio in the School, few students were rated by the same four teachers. An attempt was made to estimate the reliability by the intraclass correlation method, which involved running a one-way analysis of variance where the four ratings given each student constituted a group. Reliability was computed only for those students having four ratings on each variable. The following intraclass correlations were obtained: .251 (45 females in "Originality"), .217 (73 males in "Originality"), .392 (58 males and females in "Artistic Potential"). These intraclass correlations provide minimal estimates that are quite low, although statistically significant at the .01 level. The smallness of the obtained correlations may in part be due to the limitations of the four-point scale, which does not permit sufficient differentiation.

Perhaps a more immediate way of representing the reliability of the ratings for a sample of 58 students is given in Table 2.12.

TABLE 2.12

RATINGS OF "ARTISTIC POTENTIAL"

			No. of Students Rated
1) All 4 teachers agree on the same score (4X)*			8
2) 3 teachers agree, one gives different score (3X, 1Y)	X-Y=1	17	
	X-Y=2	1	
	X-Y=3	0	
			18
3) 2 teachers agree, but disagree with two others (2X,2Y)	X-Y=1	16	
	X-Y=2	1	
	X-Y=3	0	
			17
4) 2 teachers agree, but disagree with two others (2X,1Y,1Z)			15
5) All teachers disagree (1X,1Y,1Z,1W)			0
			58

*X,Y,Z,W represent the four different scale-points of the rating. X-Y=1 indicates that whatever the numerical value of the X-rating was, it differed by only one scale-point from the other rating given (Y). X-Y=2 indicates that the numberical value of the X-rating differed by two scale-points from the other rating given.

For instance, it will be seen that in 8 (14%) cases there is perfect agreement among the four teachers doing the rating; in 18 (31%)

cases there is perfect agreement among three teachers, the other rater differing in 17 cases by only one scale-point and in one case by two scale-points; in 16 (28%) cases there is a split, two of the raters agreeing on one rating and the other two on another rating only one scale-point removed; and so on. In other words, 42 cases (72%) were rated with a discrepancy that is no greater than of the type: 3,3,2,2.

Grades

a) Art Grades.--This is an average based on all the grades a student received in Art courses, obtained from the files of the School. Following the system used by the School administration, a letter grade "A" was given 12 points, "A-" 11 points, "B+" 10 points, and so on until "F" = 0 points.

b) Academic Grades.--This is a similarly obtained average in courses other than Art (History, Humanities, Mathematics, etc.).

Questionnaire

Personal and family structure data were collected by means of a general questionnaire (see Appendix C), adapted from one used in a study by Hess, Sims, and Henry (1963).

4. Administration of Tests

The instruments listed in the preceding section were divided into three batteries, to be administered at different times. Within each battery, cognitive tests were alternated with personality inventories, speed tests with untimed tests, and so on, to achieve a maximum of diversity. Table 2.13 lists the order in which the tests were given, and the time that each test took to be completed, instructions included.

TABLE 2.13

LISTS OF TESTS INCLUDED IN THE THREE BATTERIES

A. Battery No. 1	Time with Instructions
1. Questionnaire	14' (Average)*
2. Unusual Uses (10')**	13'
3. A-V Value Scale	29' (Average)
4. Spatial Visualization (10')	14'
5. Brick Uses (5')	7'
6. Sentence Completion (3rd Person)	18' (Average)
7. Hidden Shapes (2.5')	3'
	1 h. 38'

*"Average" refers to the average time that the last student in a given testing session finished a non-speed test.

**Amount of time in minutes provided for tests with time limits is given in parentheses.

TABLE 2.13--Continued

	Time with Instructions
B. Battery No. 2	
1. Semantic Differential	12' (Average)
2. Thing Categories (3')	4'
3. TAT (4' for each of 4 slides)	21'
4. Match Problems (8.5')	10'
5. Color Association	10' (Average)
6. 16 PF	55' (Average)
	1 h. 52'
C. Battery No. 3	
1. Wonderlic (12')	13'
2. Word Association (8')	10'
3. Perceptual Memory	13'
4. Sentence Completion (1st Person) . .	17' (Average)
5. Object-Question Test (9')	10'
6. Welsh Figure-Preference	31' (Average)
	1 h. 34'

The testing was conducted at the lecture hall of the Art School. Recruitment of subjects was handled by the administration of the School. Each second- and third-year student was invited, via a letter signed by the Dean of the School, to participate in the testing session. In order to collect as many cases as possible, the 1st Battery was administered three times, the 2nd Battery five times, and the 3rd Battery five times. A total of 13 two-hour testing sessions were thus given in the period between April 10 and June 14, 1963.

5. Analysis of the Data

After the protocols were scored, and scoring reliabilities established, each subject's scores on all the tests were punched on IBM cards. Two cards were needed to code the information for each subject. The scores on each variable were then standardized for each sex separately with mean 50 and SD 10, and punched into new cards. The IBM 7094 computer was used in tabulating and analyzing the data.

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CHAPTER III

RESULTS I: COMPARISON OF ART STUDENTS WITH AVAILABLE NORMS

We may begin the analysis of results by comparing the performance of our sample with that of the relevant population norms on those tests for which such norms are available.

The means and standard deviations for the total sample and for the core sample for all tests are given in Appendix D.01 and D.02. In the present chapter we discuss only those results for which comparisons to relevant norms can be made. First we shall present comparisons for the cognitive tests, then for the perceptual tests, and finally for the personality tests. These analyses will be followed by a brief section in which selected relationships among the cognitive, perceptual, and personality tests will be presented, a subject to which we shall return at greater length in an ensuing chapter. Although the correlation tables throughout are based on the core sample of students who took all the tests (N=179), the analysis of results for individual instruments are based on the total number of subjects taking the particular test. Since there were numerous sex differences in performance, many of the analyses will be presented by male and female subjects separately.

1. Cognition

Relevant norms are available for three of the cognitive tests: the Wonderlic IQ, the 16PF Factor B (intelligence), and Unusual Uses. The data for these three instruments are given in Table 3.01.

Although both male and female art students performed better than general population norms on the Wonderlic, and female art students were at the norm for college students, the male art students were significantly (although not excessively) below the second and third year college norms. On the 16PF general intelligence factor, both male and female art students scored somewhat higher than college norms, and significantly so in the case of the female students. The difference in the performance on the 16 PF and the Wonderlic may be due to the circumstance that one is a speed test and the other not; or that the 16PF norms are based on college freshmen and the Wonderlic norms on college sophomores and juniors.

TABLE 3.01

COGNITIVE TESTS: COMPARISON OF ART STUDENT MEANS WITH AVAILABLE POPULATION NORMS

Cognitive Tests	Art Students						Normative Data				"p" Value of "t" Test	
	A Males			B Females			C Males		D Females		M	F
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD		
Wonderlic	97	22.1	5.5	113	22.2	5.0	24.6	7.4[a]	22.6	7.3	C>A**	N.S.
16 PF (B)	94	8.0	2.0	111	8.1	2.1	7.9	1.7[b]	7.6	1.8	N.S.	B>D*
Unusual Uses	130	14.5	5.6	136	14.7	4.8	14.7	4.8[c]	....	...	N.S.	....

[a] Wonderlic Personnel Test Manual, 1961, Table II(a). Sample: 3232 males, 1282 females.

[b] IPAT, 16 PF Test, Preliminary Norms for the 1962 Edition. Sample: 535 males, 559 females.

[c] J. P. Guilford et al.: Reports from the Psychological Laboratory. Los Angeles, The University of Southern California, #21. Sample: 204 males.

$*p = .05$

$**p = .001$

There are no differences between the sample and the available comparison group for the Unusual Uses Test. The domain of cognition measured by this test is one suggested by Guilford (1957) as relevant to artistic performance. Since the comparison data are from a study of Marine Corps officers, and are not very relevant, no conclusion can be drawn other than that the performance of the present sample on this test is not unique.

In general, it may be said that so far as the cognitive measures are concerned, at least as represented by two reasonably standard tests of adult intelligence, the performance of the art students was at about the mean for similar age and education groups. It is probably also safe to say that relative to their respective norms, the female art students performed somewhat better on the two intelligence tests than did the male art students. On one Guilford-type divergent thinking test, the performance of the art students was no different from that of an available group of selected military officers.

2. Perception

Relevant norms are available for two of the four instruments designed to measure perceptual modes, i.e., Spatial Visualization, and the Welsh Art Judgment Test. Table 3.02 presents the data comparing the performance of our sample with the existing norms.

On these two tests, the performance of our sample was markedly superior to the norms. Spatial visualization involves the ability to perceive the movement, transformation, and change in three dimensional objects when represented in two dimensional space. In addition to showing that our sample was superior in this type of perception, the results also indicate that our subjects were motivated in taking the tests. This was a crucial concern with these subjects, since we were afraid that art students might not take the tests, and especially the speed tests, seriously. More than this, speed apparently was not the most crucial factor in the relatively pedestrian performance of the group on the intelligence measures, for the Wonderlic correlated .41 with Spatial Visualization for the core sample. Although both are speed tests, the one requires verbal and mathematical fluency and the other is non-verbal and non-numerical, and it is perhaps here that the difference in performance relative to the normative groups lies. The well-established great difference in performance in Spatial Visualization between males and females was found also in our sample, the males outperforming the females very significantly. However, relative to their respective population norms, the female art students did better than the male art students.

The Art Judgment scale of the Welsh Figure Preference Test is said to measure aesthetic perception. The very high scores obtained by our subjects are of course in conformity with the nature of our sample. Again, besides being of interest in their own right,

TABLE 3.02

PERCEPTUAL TESTS: COMPARISON OF ART STUDENT MEANS WITH AVAILABLE POPULATION NORMS

Perceptual Tests	Art Students						Normative Data				"p" Value of "t" Test	
	A Males			B Females			C Males		D Females		M	F
	N	$\bar{X}$	SD	N	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD		
Spatial Visualization	130	18.6	7.5	133	13.0	6.0	16.6	7.2[a]	9.0	6.2	A>C**	B>D***
Welsh Art Judgment Scale	97	34.5	11.9	113	35.2	9.5	17.3	11.5[b]	19.3	12.2	A>C***	B>D***

[a] Guilford-Zimmerman Aptitude Survey Manual, 2nd edition, Table 8. Sample 446 males, 356 females.

[b] Welsh Figure Preference Test, Preliminary Manual, 1959, Table 2. Sample: 75 males, 75 females.

**p = .01

***p = .001

the high scores are an indication--if more indication were needed--that our subjects took the tests seriously and seemed motivated to perform to the best of their abilities.

3. Personality

The Study of Values

The Allport-Vernon-Lindzey Study of Values was designed to measure the relative strength of six basic value-orientations or motives in personality, i.e., Theoretical, Aesthetic, Political, Economic, Social, Religious. It is assumed by the authors of the test that the values represented in the instrument are important aspects of the motivational structure underlying the observed behavior of individuals.

In our study it was expected that art students would score very high in Aesthetic value, and low in Economic and Social values. The results obtained and a comparison with general college population norms are presented in Table 3.03.

TABLE 3.03

VALUES: COMPARISON OF ART STUDENT MEANS WITH GENERAL COLLEGE POPULATION NORMS[a]

Values	Male Art Students (N=129)	Male College (N=2489)	Significance Level of "t"	Female Art Students (N=134)	Female College (N=1289)	Significance Level of "t"
Theoretical	44.16	43.75	N.S.	42.68	35.75	.001
Economic	36.16	42.78	.001	33.07	37.87	.001
Aesthetic	52.02	35.09	.001	55.04	42.67	.001
Social	31.94	37.09	.001	33.46	42.03	.001
Political	38.82	42.94	.001	37.34	37.84	N.S.
Religious	37.03	38.20	N.S.	38.32	43.81	.001

[a] From Allport-Vernon-Lindzey Study of Values, Manual, 3rd ed., p. 12.

It is immediately apparent that the values of the art students differ sharply from those of the normative college students. And we ought perhaps to add here that some of the most characteristic aspects of the art student's personality seem to be reflected in these results, again a subject to which we shall return at some greater length in an ensuing chapter. Both male and female art students manifest extremely high Aesthetic and low Economic and Social values. In addition, male art students are very low in Political (power) values, and female art students strikingly low in Religious and high in Theoretical values. This finding, that female art students have significantly higher Theoretical values than the norm for their age and educational level, fits rather nicely with the previously observed superiority of their performance on the cognitive tests, where they did better relative to the appropriate sex norms than did the males relative to their norms. The Allport-Vernon-Lindzey Manual suggests that a high Theoretical value is indicative of a cognitive attitude toward experience.

The mean Aesthetic score obtained by our sample is significantly higher ($p = .001$) than the highest Aesthetic values for any group for whom data are given in the Manual, including the norms for art school students elsewhere. Similarly, the mean Social value of our sample is lower than that of any group reported in the Manual; the mean Economic value is lower than most, the only exceptions being freshmen medical students, graduate nurses, clergymen, and theological students.

A noteworthy feature of the art students' value profile is presented graphically in Figures 3.01 and 3.02, where the value profiles of several professional groups, including the art students, are plotted relative to each other. It will be seen that the difference between the highest value (Aesthetic) and the next highest value (Theoretical) for the art students is much greater than between the primary and secondary value of any other group. This characteristic held when the values profile of our sample was plotted against each of the 29 occupational and professional groups given in the Manual, except for one group of male freshmen medical students which had a very pronounced Theoretical value.

The implications of this seem to us clear: the art students are committed to the values of their profession single-mindedly--more so than any other group of students are committed to the values relevant to their profession. Or perhaps it might be said that in our society, art as a serious calling requires the whole-hearted commitment to a single value at the expense of other values, while other career lines for which there is greater social support do not entail the same singleness of personal value commitment.

Sixteen Personality Factors Test (16PF)

This section will deal with the performance of the art students on the Cattell 16 Personality Factors Test in relation to the norms. The data are presented in Table 3.04 (page 39). It is readily apparent that for 11 of the 16 factors there are significant differences between the performance of the male and female art students in our sample and the norms. Both the male and female students differ significantly from their respective norms on six of

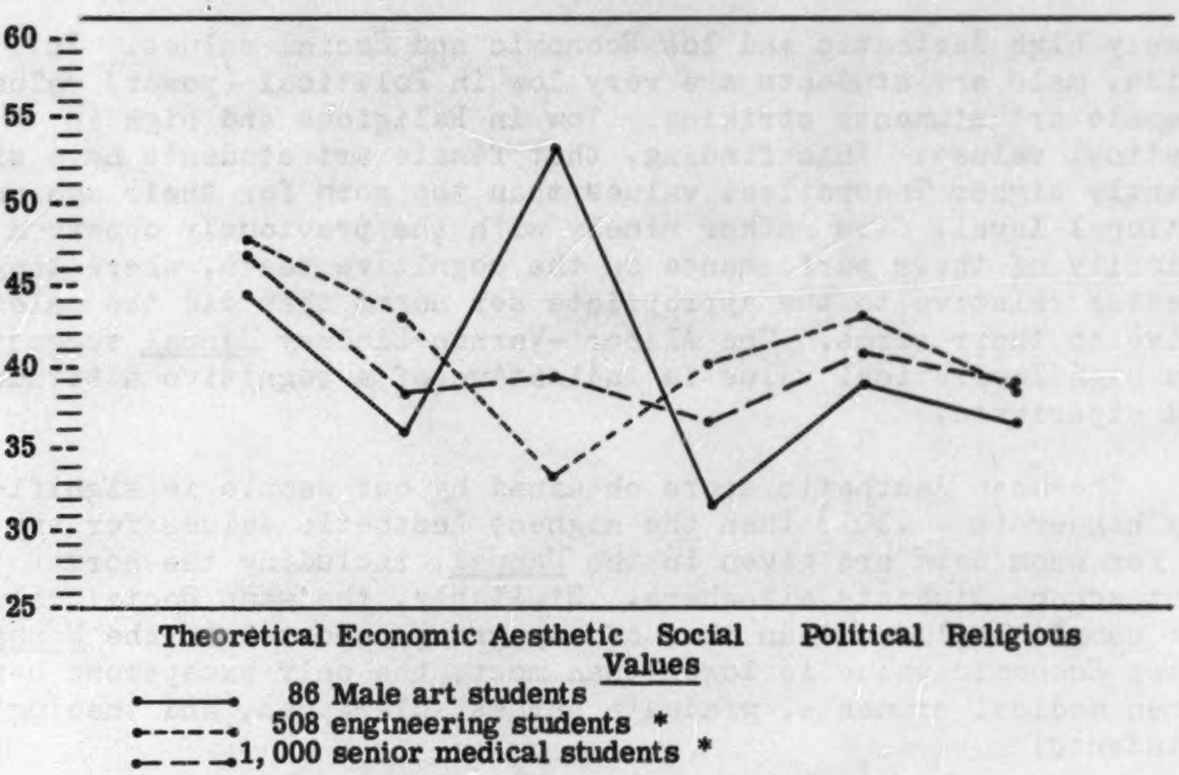

Fig. 3. 01. -- Value profile of male art students compared with that of representative college samples.

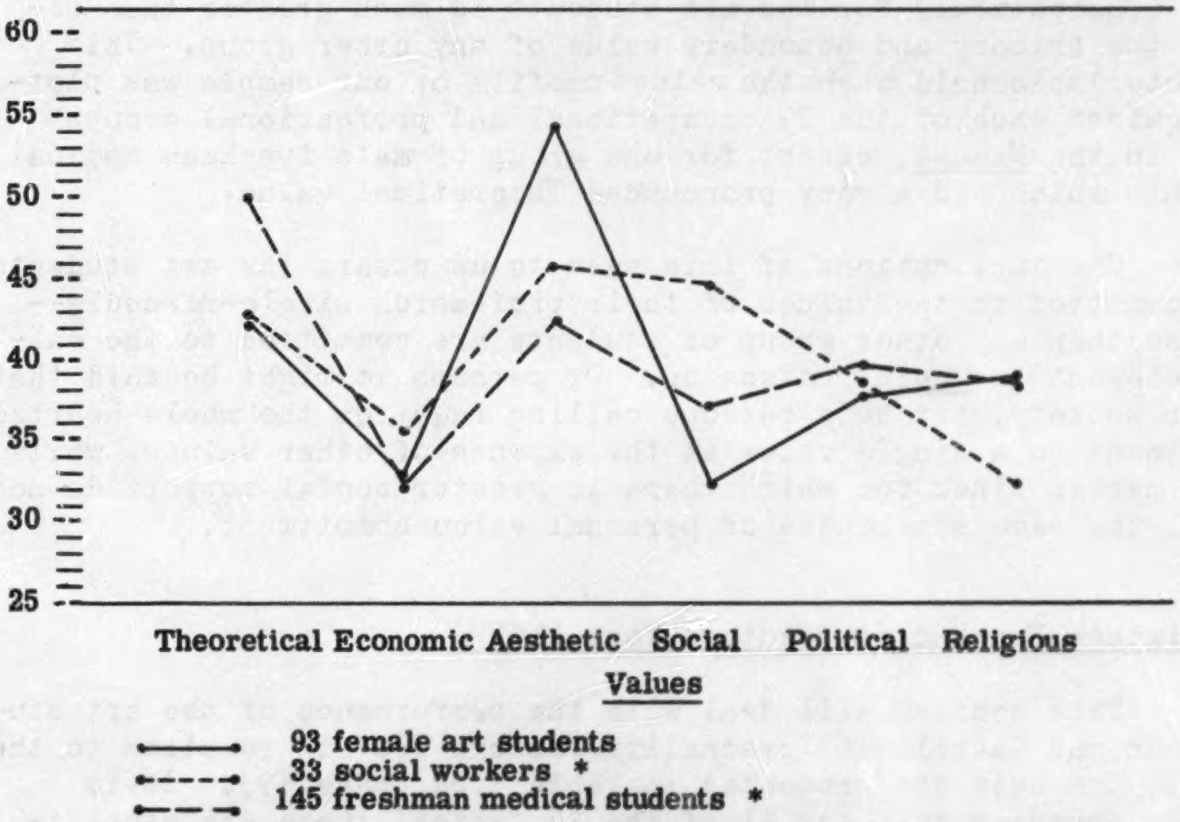

Fig. 3. 02. -- Value profile of female art students compared with that of representative college samples.

*From Allport Vernon-Lindzey Study of Values, Manual, 3rd edition, pp. 14-15.

TABLE 3.04

16 PERSONALITY FACTORS: COMPARISON OF ART STUDENT MEANS WITH GENERAL COLLEGE POPULATION[a]

Factor	Art School Males (N=94)	College Males (N=535)	Significance Level of "t"	Art School Females (N=111)	College Females (N=559)	Significance Level of "t"
A. Cyclothymia	7.63	9.79	.001	8.89	12.06	.001
B. Intelligence	8.04	7.92	N.S.	8.08	7.57	.05
C. Ego-strength	13.99	15.35	.01	14.06	14.58	N.S.
E. Dominance	14.17	13.78	N.S.	12.96	10.61	.001
F. Surgency	12.70	16.00	.001	13.19	16.09	.001
G. Superego	11.24	12.64	.01	9.68	13.14	.001
H. Parmia	11.41	12.99	.01	12.27	12.20	N.S.
I. Premsia	9.95	8.65	.01	11.88	11.95	N.S.
L. Protension	10.16	9.76	N.S.	9.45	8.00	.01
M. Autia	14.34	11.49	.001	15.65	12.71	.001
N. Shrewdness	10.46	10.96	N.S.	9.43	10.56	.01
O. Guilt	11.38	10.14	.01	11.33	11.24	N.S.
Q1 Radicalism	10.36	9.65	.05	10.34	8.74	.001
Q2 Self-sufficiency	13.33	9.86	.001	13.49	9.66	.001
Q3 Self-sentiment	9.72	10.08	N.S.	9.38	10.81	.01
Q4 Ergic tension	14.02	12.26	.01	13.86	13.51	N.S.

[a] IPAT Preliminary Normative Tables, Nov. 1963. Sample: 535 males, 559 females.

*p = .05
**p = .01
***p = .001

the _same_ variables, and in the _same_ direction.

Examining in some greater detail, first, only those factors on which _both_ sex groups differ significantly from the norms in the same direction, we may propose the following personality syndrome for our subjects. They are socially reserved and cool, and tend to avoid occupations like teaching or salesmanship that might bring them into close interpersonal contact with many others (Factor A). This corroborates the finding we have already reported with respect to their value orientations. They tend to be serious and introspective (Factor F). They are low in superego-strength (Factor G). These two factors appear to be at odds with one another, the one suggesting, according to Cattell, "soberness" and "seriousness," the other "fickleness" and "frivolity." But this contradiction may be more apparent than real, for it may mirror the frequently observed mood swings of the artist from brooding introspection on the one hand to unpredictable casualness on the other. More likely, however, the low G reflects not so much "fun and games" as a lack of serious concern with conventional social and cultural standards.

In addition, our subjects are high in autia (Factor M). Persons high in this factor are said to be "unconventional," "bohemian," "self-absorbed," "interested in art," "imaginative," "creative." "Essentially," says Cattell, "the M person has an intense subjectivity and inner mental life. . . . Occupationally high M occurs in artists, researchers, planning executives, and editors; . . . high M has been found by Drevdahl, and Cattell and Drevdahl most significantly to distinguish the more creative researchers and artists from administrators and teachers of the same eminence" (Manual, p. 16).

Finally, our subjects are high in radicalism (Factor Q_1) and high in self-sufficiency (Factor Q_2). The radicalism here does not refer to a mere set of acquired radical political and religious attitudes. It is rooted, the Manual suggests, in broader temperamental or general personality traits, individuals of this sort being "more inclined to experiment with problem solutions, less inclined to moralize, etc." (p. 18). The self-sufficiency referred to here is one of the major factors in introversion--it reflects, again according to the Manual, "a person who is resolute and accustomed to making his own decisions. . ." (p. 18).

What is perhaps most noteworthy about these findings is that five of these factors are included in the 10 factors cited by Cattell as characteristic of the "creative personality." Another way, then, of analyzing the data in Table 3.04 is by applying the weights recommended by Cattell to see how closely our subjects match the "creative personality profile" given in IPAT Information Bulletin #10. 1963. These weights were derived from Cattell and Drevdahl's work with persons of known creative achievement. When the weighted scores are added, they can be converted into "sten" scores measuring level of "general creativity." According to these weights, the raw scores of our male subjects totaled 95.9 and of our female subjects 96.9, both corresponding to the eighth sten on a normal curve. That is, by this criterion the mean "general creativity" of this sample is higher than 89 per cent of the normative college population.

The 16 PF also yielded a number of noteworthy sex differences. The female art students appear to be significantly more dominant (Factor E) than college women in general, while the male art students are more withdrawn or timid (Factor H) and more sensitive or effeminate in feeling (Factor I) than other college men. Thus, at least in these respects, the art students possess to a significantly high degree those personality attributes that are characteristic of the opposite sex. This is in accord with some theories suggesting just this as the personality constellation of artists. For example, Jung suggests that "the psychology of the creative is really feminine psychology" (Jung, 1930, p. 43). Moreover, a similar reversal in sex-appropriateappropriate attributes has been observed in the relevant behavior of children by Rau (1963). She found that ability in spatial visualization was associated with passivity and lack of aggressiveness in boys, and with aggressive-assertiveness in girls. It may be recalled that in our sample also, both the males and the females were significantly higher than their respective norms in spatial visualization.

There is one other set of observations to which we should like to call attention. The male art students are quite low in the variables ego-strength, superego-strength, and high in id tension (Factors C, G, Q_4); the women are low only in superego-strength. The role of personality dynamics in the process of creativity has been a center of interest in psychoanalytic thought for a long time. Although our measures of such dynamics are at this point too gross to contribute in any important way to the issues, it seems that on the basis of the 16PF, male artists exhibit both a higher degree of frustrated id tension (Factor Q_4), and less ego-strength (Factor C) or super-ego control (Factor G) to cope with such tension. This seems not quite in accord with what might be expected from psychoanalytic theory, which suggests that strong id drives should co-exist with a strong ego in the artist so that constructive "regression in the service of the ego" might take place. But this is mentioned only in passing here, for the application of such measuring instruments as the 16PF to the examination of psychoanalytic formulations must be viewed with even more than the ordinary caution. In any case, it is sufficient to say here, by way of summary, only that the 16PF provided a personality profile of our subjects that seems to us on a priori grounds highly sensible--it has at least the appearance of validity--and it is in keeping with what is known about the personality structure of artists and other creative people from other studies.

4. Relationships among Variables

We shall return to the over-all relationship among the various criteria of creativity--for example, between personality and divergent thinking, between values and artistic achievement--in a later chapter. Here we want merely to present, in order to illustrate the observed complexities, a number of cases of the relations between single variables (between, for example, Aesthetic value and some of the cognitive measures, between Aesthetic value and a number of the personality variables).

Relationship between Aesthetic Value and Cognition

We may begin with a consideration of the relationship between Aesthetic value and the cognitive variables used in this study. Table 3.05 presents the correlations between Aesthetic value and nine cognitive measures for males and females as abstracted from the general correlation matrix given in Appendix D.03 and D.04.

TABLE 3.05

CORRELATIONS BETWEEN ART STUDENTS' AESTHETIC VALUES AND PERFORMANCE ON NINE COGNITIVE VARIABLES

Cognitive Variables	Males (N=86)	Females (N=93)
Unusual Uses	.07	.25*
Brick Fluency	.03	.26*
Brick Flexibility	.13	.31*
Ideational Fluency	-.01	.22*
Object Question	.33**	.26*
Word Association Fluency	.03	.07
Word Association Flexibility . . .	.15	.17
Wonderlic IQ	.07	.13
16 PF IQ	.14	.16

*p = .05 **p = .01

The pattern of correlations revealed in Table 3.05 presents some interesting issues. It is clear, for example, that some of the cognitive tests are related to the value scores, others not; and that the relationships tend on the whole to be higher for the female art students than for the male art students.

In order to clarify these observations, it is necessary to anticipate briefly here a number of the findings presented in a later section dealing with the factor analysis of our instruments (Appendix D.06). The factor analysis showed that the first five tests given in Table 3.05 belong together: they all load high on one factor only. The single noteworthy characteristic of these tests is that they have all been designed to measure "divergent thinking," as this construct is defined by Guilford. The last two tests are measures of general intelligence, and they load highest on a different factor from the first five. Word Association Flexibility, initially thought to be a divergent thinking instrument, loads highest on the same factor as the intelligence tests. Word Association Fluency, although having the highest loading on the "divergent thinking" factor, loads on several other factors including general intelligence. Thus it may be said that the first five tests in Table 3.05 are more or less pure divergent thinking measures, the last three general intelligence measures, and the Word Association Fluency test does not fall clearly into either category. Although the correlations in Table 3.05 are never high and do not differ significantly between males and females, they do suggest that for female art students Aesthetic value correlates significantly with the divergent thinking tests but not with the intelligence tests, and that for male art students Aesthetic value is not correlated either with the divergent thinking or the general intelligence tests, except for one variable.

Relationships between Selected Values and Personality Variables

We may now turn to a second illustration of the complex but not necessarily unsystematic relations among the variables by examining the correlations between Economic and Aesthetic values on the one hand, and the 16PF personality variables on the other. The data are given in Table 3.06.

TABLE 3.06

CORRELATIONS BETWEEN ART STUDENTS' ECONOMIC, AESTHETIC VALUES, AND SCORES ON THE 16PF PERSONALITY VARIABLES

Personality Variables		Economic Value		Aesthetic Value	
		Males (N=86)	Females (N=93)	Males (N=86)	Females (N=93)
Cyclothymia	A	.16	.16	-.26*	-.15
Intelligence	B	-.17	-.11	.14	.16
Ego-strength	C	.21	.04	-.13	-.18
Dominance	E	.07	-.06	.05	.25*
Surgency	F	.16	.06	-.12	.05
Superego	G	.11	.24*	-.24*	-.28**
Parmia	H	.20	.03	-.18	.11
Premsia	I	-.45***	-.33**	.46***	.27**
Protension	L	-.12	-.09	.19	.06
Autia	M	-.40***	-.19	.42***	.30**
Shrewdness	N	.30**	.36***	-.25*	-.26*
Guilt	O	-.04	.05	.14	-.03
Radicalism	Q_1	-.12	-.13	.06	-.04
Self-sufficiency	Q_2	-.25*	-.36**	.18	.23*
Self-sentiment	Q_3	.22*	.26*	-.20	-.29**
Id Tension	Q_4	-.14	-.06	.30**	.19

*p = .05 **p = .01 ***p = .001

It is immediately obvious that subjects high in Economic value have a very different personality profile from those high in Aesthetic value. To make the point, one need but compare premsia (Factor I)--significant negative correlationswith Economic value but significant positive correlations with Aesthetic value; with shrewdness (Factor N)--significant positive correlations with Economic value but significant negative correlations with Aesthetic value. In addition, one may observe that for male art students, Economic value is related negatively to sensitivity (Factor I), imaginativeness (Factor M), self-sufficiency (Factor Q_2), and positively to shrewdness (Factor N) and self-sentiment (Factor Q_3). Aesthetic value for the male students is related positively to sensitivity (Factor I), imaginativeness (Factor M), id tension (Factor Q_4), and negatively to friendliness (Factor A), superego-strength (Factor G), shrewdness (Factor N). The pattern is very similar for the female students. However, it is perhaps meaningful that Aesthetic value is not correlated significantly with id tension for the females as it is for the males, and that this value is correlated for them instead with dominance (Factor E) and self-sufficiency (Factor Q_2), which are not related to Aesthetic value for the males. This would tend to confirm the observation that female students holding high Aesthetic value seem to possess more "masculine" or "bolder" personality attributes; that males who hold high Aesthetic value tend to be under somewhat more "tension" and are more likely to be socially "aloof" rather than "dominant."

Relationships between Personality Attributes and Cognition

We have illustrated the complexities of the relationships among the several variables by presenting data for the relations between values and cognition, and between values and personality. We consider now, illustratively again, the relationship between two personality factors, dominance (16PF Factor E) and self-sufficiency (16PF Factor Q_2) on the one hand, and performance on the nine cognitive variables on the other. The data are presented in Table 3.07.

It is immediately obvious that there are a number of interesting relations, although the reason for some of the results is by no means self-evident. For example, the personality attributes are related significantly to the cognitive variables in eight of the 18 observations for female students, in only three of the 18 observations for the male students. There are significant differences in the correlations for the males and females at at least the .10 level in seven of the 18 cases. One does not want to make too much of such indeterminate trends, yet one cannot but note at least for future reference that for males eight of the possible 18 correlations are, however slightly, negative; for the females only two are negative.

The pattern becomes somewhat clearer if we adopt the same

TABLE 3.07

CORRELATIONS BETWEEN ART STUDENTS' SCORES ON DOMINANCE, SELF-SUFFICIENCY, AND PERFORMANCE ON NINE COGNITIVE VARIABLES

Cognitive Variables	Dominance			Self-sufficiency		
	Males (N=86)	Females (N=93)	Significance of Difference between rho's[a]	Males (N=86)	Females (N=93)	Significance of Difference between rho's
Unusual Uses	-.10	.38***	.001	-.18	-.04	N.S.
Brick Fluency	-.01	.24*	.10	-.23*	.08	.05
Brick Flexibility	.05	.24*	N.S.	-.16	.06	N.S.
Ideational Fluency	-.17	.08	.10	-.18	.16	.02
Object Question	.07	.17	N.S.	.00	.18	N.S.
Word Association Fluency . .	.16	.25*	N.S.	.09	.05	N.S.
Word Association Flexibility	.34**	.24*	N.S.	.12	.25*	N.S.
Wonderlic IQ	.31**	.20	N.S.	-.12	.26*	.02
16 PF IQ	.08	-.05	N.S.	.13	.37***	.10

[a] Fisher's "z" transformation, two-tailed distribution.

*p = .05 **p = .01 ***p = .001

division of the nine cognitive tests into divergent thinking measures and general intelligence measures as we did in connection with Table 3.05. The present results then suggest that dominance in female students is related to divergent thinking (the first five cognitive tests) and that it is not for the male students. However, dominance is related equally to general intelligence for the two groups. Conversely, self-sufficiency seems to be related positively to general intelligence for females and not for the males, but it seems to be negatively related to divergent thinking for males and not for the females. Again we wish to emphasize that these are merely trends to which we are pointing here, but trends that bear further investigation, and in fact we shall return to these in somewhat greater detail in a later analysis.

5. Summary and Discussion

Characteristics of Art Students

In general, the art students in our sample possess the perceptual, evaluative, and personalistic characteristics usually associated with artists. These characteristics vary quite markedly from those given for college students. With respect to the cognitive characteristics (performance in tests of general intelligence and divergent thinking) our sample did not differ substantially from comparable norms. Regrettably, few relevant comparisons are available for the divergent thinking tests, and so the conclusion that art students are not superior to other students in this respect must be tentative. The superiority of the art students in one aspect of perception--spatial visualization--is very marked. This superiority does not seem to be a function of experience in the Art School, since the third year students actually scored somewhat lower than second year students in this attribute. The results from the Welsh Figure Preference Test indicate that our sample has standards of perceptual preference closely approximating the standards of recognized artists. Again, the second year students performed slightly better than did the third year students, an observation suggesting that further training or experience is not the determining factor in "superior" perceptual preference.

The value pattern of our art students conforms very closely indeed to what might be expected for those committed to a career in the arts: very high Aesthetic value and very low Economic and Social values are clearly appropriate. Indeed, it was not the pattern itself but its extremity that was striking. The very high Theoretical value, especially for the female art students, was also noteworthy although not unexpected, MacKinnon (1959) having found similarly high Aesthetic and Theoretical values for the highly creative people he studied.

If the cognitive instruments failed to reveal any "creative pattern" for our students in relation to other students, the performance of our subjects on the 16PF, weighted according to Cattell's procedure, showed a very high "creative personality" profile. The general portrait emerging from the 16PF describes the art students of both sexes as very independent (Factor Q_2) and aloof (A), imaginative (M) but not given to enthusiasm (F). They shun societal standards (G) and are radical (Q_1). Male students tend to be shy (H) and sensitive (I); they have strong guilt feelings (O), low ego-strength (C), and powerful unresolved primary drives (Q_4). Female students tend to be more intelligent (B) and dominant (E) than the norms given for relevant sex groups; they are also "harder" and "more aggressive (L), more "natural" and "spontaneous" (N), and "less concerned with social approval" (Q_3).

Sex Differences

The over-all findings point to deep, complex differences between the male and female art students in relation to their choice of art as a field of serious study, and these differences must be borne in mind when dealing with the general term "art student." Females choosing art as a field of study seem to be more intellectually oriented than males. For example, their performance on the cognitive and perceptual tests relative to their appropriate age and sex norms was superior to that of the males relative to their appropriate age and sex norms. Also, the Theoretical values of the female art students were significantly higher than female college norms; the Theoretical values of male art students were not higher than the male norms. It will be recalled that high Theoretical values imply a cognitive--an intellectual--approach to experience.

With reference to personality variables, the female art students are more dominant than other female students of the same age and educational level, male art students are more timid, sensitive and effeminate in feeling than other male students. Male art students appear to have sharper feelings of guilt and id tension than do the female students.

It is possible to interpret these findings in terms of the different attitudes that males and females may have to the study of art, and to the different meanings given by society to such study. For females, art school seems a socially-approved choice--why should not a girl "fool around" with art until she settles down. Besides, it is not an unexpected outcome of her presumed greater avocational interest in the "finer things." In contrast, for males, the study of art is at best a somewhat "peculiar" and surely hazardous choice. Compared with doctor, lawyer, chemists, to say nothing of business executive or tycoon, artist as an ultimate occupation is often seen by others, if not by oneself, as off the beaten economic career track, surely not very masculine, not industrially productive, and perhaps even mildly parasitic.

At another level of analysis, the observed differences may be attributed to other factors. Preliminary findings by Rau (1963), to which we have already referred, indicate that ability at spatial visualization is related negatively to aggressiveness in boys but positively to aggressiveness in girls. This points to the possibility that a complex of perceptual, cognitive, and personalistic relationships become established quite early in childhood, and that it may be the effects of this that are operative in the observed differences.

At still another level, it is possible to argue that the observed reversals in sex-appropriate characteristics are necessary for students who are to become artists. Openness to experience and freedom of expression are pre-requisites for artistic endeavor and excessively rigid sex-appropriate attitudes tend to limit both the opportunities for experience and the flexibility of expression. Paradoxically, a very sensitive girl may in effect be less sensitive than one who is relatively aggressive, since she would miss a variety of feelings and impressions that would be hidden by her artificially limited field of experience. Similarly, the stereotypically masculine boy would have difficulty expressing feelings that are not congruent with his rigid sex-role. A rigidly sex-appropriate personality, at least as defined by society, may be an incubus to freedom to perceive and to express experience. We shall return to a consideration of this in the concluding chapter.

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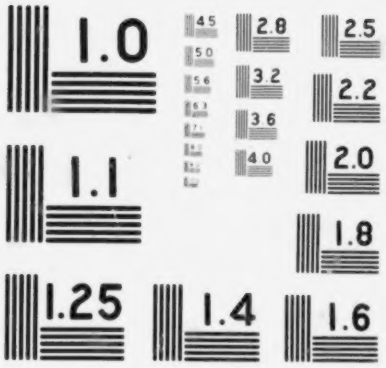

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

CHAPTER IV

RESULTS II: COMPARISON OF ART STUDENTS IN DIFFERENT FIELDS OF SPECIALIZATION

The preceding chapter dealt with the total sample of students in the Art School as if it were a homogeneous group representing a homogeneous population. In a certain sense this is of course so, and the findings reported in that chapter indicate that students at this School do indeed constitute a group significantly different in many respects from college students in general. However, "art student" becomes too generic a category as soon as one becomes acquainted with the situation at the School in greater detail. Although all freshmen begin by taking essentially the same courses, those most familiar with the School claim that there are immediate and obvious differences between the students planning to become *fine artists* and those planning to work as artists in a commercial enterprise. Indeed, it is entirely reasonable to expect that differences between a future painter and a future product designer might be no less than those between a generic "art student" and, say, a generic "student of engineering."

One might go further and suggest that the differences between persons who have committed themselves, however temporarily, to careers offering prospects as disparate as those of a freelance painter and of a commercial artist might be quite systematic. For example, the one might have higher Aesthetic values, the other higher Economic values. So far as *technical* abilities are concerned, the two might not differ in any identifiable way, but the *spirit* in which the work is done and which is communicated in the artistic product is different. The fine artist discovers a problem within himself, which he then proceeds to state and to solve according to his own logic and rules. Other persons in the art field--illustrators, designers--are usually given a problem to solve, and the logic of their solution must be more or less public and immediately comprehensible. Thus the "pop" artist's reproduction of an advertising illustration may be technically indistinguishable from the original done by the advertising artist. But the emotional and cognitive process going into the two works is presumably very different.

To investigate the nature and extent of such differences, or indeed if they exist at all, the sample was divided into four fields of specialization or "majors," as indicated in Table 2.02.

2

For some purposes, in order to highlight possible differences, only two groups are contrasted: the Fine Arts students against the Applied Arts students, the latter group being composed of students in Advertising and Industrial Arts. In view of their small number, Art Education students are not included in these latter analyses.

1. Comparisons on Descriptive Variables: Age, Religion, etc.

With respect first to age, Fine Arts and Art Education students are about three years older than those in Advertising and two and a half years older than those in Industrial Arts. The mean age of the Fine Arts students is 23.9 (S.D. 6.9); of those in Art Education [illegible].9 (S.D. 7.0), in Advertising 21.1 (S.D. 2.9), in Industrial Art 21.7 (S.D. 3.7). The probable reason for these differences is that more Fine Arts students attended college before coming to the Art School. The data are given in Table 4.01. It is clear that although about 60 per cent of the Fine Arts students had been to college, and in fact 16 per cent had actually graduated, 40 per cent of the Applied Arts students had been to college and only 2 per cent had graduated. The difference between the two groups with respect to the number attending college is statistically significant (Chi-square, 8.9; p = .005).

TABLE 4.01

STUDENTS' PREVIOUS EDUCATION

	Fine Arts		Applied Arts	
	No.	%	No.	%
Completed High School . . .	50	39.1	62	59.6
Some College	57	44.5	40	38.5
Completed College	17	13.3	2	1.9
Some Post-graduate Study .	4	3.1	0	....
Total	128	100.0	104	100.0

With respect to family origins, although the Fine Arts students have more education, the income of their parents tends to be lower. Forty-four per cent of the Fine Arts students report that their parents have an income less than $7,500; 33 per cent of the Applied Arts students report that their parents have an income of less than $7,500.

Table 4.02 presents the data regarding the religious affiliation of the two groups. There are fewer Catholics, and more Jewish

TABLE 4.02

STUDENTS' RELIGIOUS AFFILIATION

	Fine Arts		Applied Arts	
	No.	%	No.	%
Protestant	46	36.5	45	43.4
Catholic	19	15.1	35	33.6
Jewish	19	15.1	10	9.6
Other	7	5.5	4	3.8
None	35	27.8	10	9.6
Total	126	100.0	104	100.0

and "uncommitted" students in Fine Arts than in Applied Arts. The difference between the number of Catholic and the number of "uncommitted" students in the two groups is significant (Chi-square, 14.6; p = .001). Only 31 per cent of the Fine Arts students report attending a place of worship at least once a month, while about 54 per cent of the Applied Arts students report doing this, a difference that is significant (Chi square, 11.1; p = .001). (Table 4.03.)

TABLE 4.03

STUDENTS' RELIGIOUS ATTENDANCE

Attends place of worship at least once a month	Fine Arts		Applied Arts	
	No.	%	No.	%
Yes	40	31.2	56	53.8
No	88	68.8	48	46.2
Total	128	100.0	104	100.0

With respect to age at which they began to do art work, 33 per cent of the Fine Arts students report "before grade two," 22 per cent of the Applied Arts students report this. However, 16 per cent of the Fine Arts students report "after high school," 9 per cent of the Applied Arts students report this. In general, more Fine Arts than Applied Arts students report beginning to work in art either very early or very late in their development.

2. Comparisons on the Cognitive Variables

The data for the core group of 179 students divided by sex and field of specialization were used for the comparisons in this section. Table 4.04 presents the mean scores of the eight subgroups on the nine cognitive variables. The differences were analyzed in a one-way analysis of variance, with three main effects: Sex, Field of Specialization (Major), and Interaction between Field and Sex.

None of the "F" values was significant. However, some general trends may be noted. Male Fine Arts students tend to do better on the first four tests than on the last four tests; male Advertising students tend to do better on the second four tests than on the first four tests. In the preceding chapter we pointed out that the first five tests are of the "divergent" thinking type, the last four of the "general intelligence" type. We may then say, at least as trends for further examination, that male Fine Arts students tend to perform better than other art students on divergent thinking tests but less well than the Advertising students on general intelligence tests, the Advertising students tend to perform less well than other students on divergent thinking tests, but better than the other students on general intelligence tests. This pattern does not hold for the females, where the Fine Arts students tend to perform better than the other groups on both divergent thinking and the general intelligence tests. But pending further study, it must be emphasized that these observations refer to mere trends, and if the purported differences among the groups are reflected in our data with any certainty, they must be sought elsewhere.

3. Comparisons on the Perceptual Variables

The performance of the several groups on the perceptual tests was submitted to the same analysis as the one described in the previous section. Table 4.05 presents the relevant data. It is apparent that none of the effects due to major was significant. The effect of students' sex was significant only on Spatial Visualization. This was a difference that was expected, for significantly better performance by males than by females is indicated in the Manual. The observed interaction effect on the Perceptual Memory Test seems due to the fact that the male Advertising students committed the least errors but the female Advertising students committed the most errors.

A trend in the data perhaps meriting comment involves the performance of Fine Arts versus Advertising Arts students when all five perceptual tests are considered. In general, of the four groups defined by field of specialization, the male Fine Arts students perform least well, the male Advertising Arts students perform best; in contrast, the female Fine Arts students outperform all other female groups. This pattern is quite similar to the one observed on the general intelligence tests, where the male Advertising students also performed better than the male Fine Arts students, while the female

TABLE 4.04

ANALYSIS OF VARIANCE: COGNITIVE VARIABLES--MEANS AND "F" VALUES[a]

	N.	Unusual Uses	Brick Fluency	Brick Flexibility	Ideational Fluency	Object Question	Word Association Fluency	Word Association Flexibility	Wonderlic I.Q.	16 PF I.Q. (Factor B)
					Male					
Fine Arts	35	15.3	16.2	10.5	14.3	7.9	55.0	44.6	21.1	8.2
Art Education . . .	12	14.9	16.3	10.2	15.3	6.9	56.3	42.8	20.2	7.9
Advertising	16	13.7	15.4	8.5	14.1	8.7	56.1	48.4	22.7	8.3
Industrial Arts . .	23	14.6	15.6	9.4	15.4	6.0	48.4	41.9	23.5	8.0
					Female					
Fine Arts	44	15.2	17.5	11.7	14.6	9.7	57.3	45.8	23.0	8.6
Art Education . . .	15	14.1	16.7	10.0	12.7	8.2	54.1	46.3	21.9	7.8
Advertising	7	13.7	15.0	9.1	17.4	6.4	60.6	45.0	22.0	6.4
Industrial Arts . .	27	13.5	13.7	9.9	13.11	7.3	55.0	45.9	20.9	7.9
					"F" Value Effects					
	Degrees of Freedom									
Sex	1,171	.43	.00	1.15	.59	2.48	1.76	.94	.11	.02
Major	3,171	.96	1.79	2.57	.35	2.11	1.05	.38	.35	1.10
Interaction	3,171	.14	.75	.17	2.32	.95	.50	.45	2.11	1.69

[a] The Mean Squares and Sums of Squares for this table are reported in Appendix D.05.

TABLE 4.05

ANALYSIS OF VARIANCE: PERCEPTUAL VARIABLES--MEANS AND "F" VALUES

	N.	Spatial Visualization	Hidden Shapes	Matches	Perceptual Memory (Error Score)	Barron-Welsh Art Scale
			Male			
Fine Arts	35	17.60	21.03	5.68	22.17	31.66
Art Education . .	12	13.92	19.42	9.50	25.03	38.58
Advertising . . .	16	20.44	24.25	7.25	14.25	36.12
Industrial Arts .	23	19.74	20.17	6.52	19.69	35.26
			Female			
Fine Arts	44	13.23	21.00	7.34	19.61	34.66
Art Education . .	15	13.00	18.80	5.07	19.13	39.33
Advertising . . .	7	14.14	20.86	5.86	28.14	32.28
Industrial Arts .	27	12.67	20.81	5.22	18.48	33.74
			"F" Value Effects			
	Degrees of Freedom					
Sex	1,171	26.60***	.13	.19	.25	.13
Major	3,171	3.02	2.36	.24	.60	1.88
Interaction . . .	3,171	1.57	.64	1.43	3.46*	.76

*p = .05 ***p = .001

[a] The Mean Squares and Sums of Squares for this table are reported in Appendix D.05.

Fine Arts students performed better than any other female group. But again these are mere trends, and it is clear that neither the perceptual nor the cognitive measures distinguish reliably among the several fields of specialization

4. Comparisons on Values

When an analysis of variance is performed on the mean value scores of the eight groups defined by sex and major, it becomes apparent that the students in the several fields of specialization differ significantly in Economic, Aesthetic, and Social values. The data are given in Table 4.06.

It is of immediate interest that the three values showing differences among fields of specialization within art are exactly the same three values which differentiate between both male and female art students and their respective college norms (Table 3.03). These are the three values that seem crucial to the study of individuals involved in the arts. In the present set of data, for instance, male Fine Arts students have appreciably lower scores in Economic values than those of any of the other male groups. On the same value, female Fine Arts and Art Education students differ markedly from female Advertising Art and Industrial Art students. In Aesthetic value, Fine Arts students of both sexes score higher than any of the other groups of students, the female students differing more from the other groups than do the males. In Social value, the difference seems to be due to the high score of the Art Education students relative to the other groups of art students.

What is also apparent is that all the observed differences conform to expectations--they are entirely reasonable: lower Economic values seem reasonable for students contemplating a career in fine arts as compared with students contemplating a career in industrial design or advertising. As we shall show in a subsequent analysis, it is necessary for a student to reject Economic values if he is to commit himself to a career in fine arts. Similarly, a student in Fine Arts should have higher Aesthetic values than, say, a commerical or industrial artist. Art Education students, whose future career will involve much closer contact with people than the career of Fine or Applied artists, quite appropriately do have the highest Social values.

Although the effect of field of specialization was not significant with respect to Theoretical value, it is noteworthy that both male and female Fine Arts students score highest on this value while Advertising Arts students score lowest, almost exactly the reverse being the case for Political (power) values. In any event, all eight subgroups have Aesthetics as the strongest value, and seven of the eight subgroups have Theoretical value as the next strongest, the only exception being the small group of female Advertising Arts students.

TABLE 4.06

ANALYSIS OF VARIANCE: VALUES--MEANS AND "F" VALUES[a]

	N.	Theoretical	Econcmic	Aesthetic	Social	Political	Religious
			Male				
Fine Arts	35	45.06	34.08	54.60	31.63	38.40	36.83
Art Education . . .	12	44.67	36.50	50.17	35.00	36.83	37.08
Advertising	16	41.87	36.44	51.56	30.13	40.12	39.31
Industrial Arts . .	23	43.48	37.69	53.00	31.74	38.65	35.04
			Female				
Fine Arts	44	44.16	31.27	57.16	33.48	35.64	38.25
Art Education . . .	15	40.47	30.67	52.67	37.73	38.20	39.47
Advertising	7	37.57	38.00	48.28	33.00	40.00	43.00
Industrial Arts . .	27	41.37	37.55	52.78	32.15	39.48	37.15
			"F" Value Effects				
	Degrees of Freedom						
Sex	1,171	4.46	3.40	.95	2.57	.87	2.36
Major	3.171	2.71	6.19***	4.89**	3.36*	2.75	1.34
Interaction	3,171	.61	1.38	1.02	.23	1.46	.09

p = .05 **p = .01 ***p = .001

[a] The Mean Squares and Sums of Squares for this table are reported in Appendix D.05.

5. Comparisons on Personality Variables

It is not only in the Value area where significant effects for the several fields of specialization are found; they are found also in the general Personality area as measured by the 16PF. Table 4.07 presents the relevant data. Here we may note that field of specialization has significant effects for six of the 15 personality variables, students' sex for three of the variables, and there is one interaction effect between sex and field of specialization.

Cyclothymia (Factor A) refers to relative personal warmth and sociability. Significant "F's" are noted both for sex and field of specialization. It is clear that the female students are more "warm and sociable" than the male students. What is more important, there are noteworthy differences for fields of specialization. Fine Arts students of both sexes are more socially aloof than any other group, followed by Industrial Arts and Art Education students, while at the other extreme, the male and female Advertising Arts students are most "warm and sociable."

The next factor on which significant effects are noted is character or superego-strength (Factor G). This factor refers to "conscientiousness and responsibility." Again the effect appears both for sex and field of specialization. We observe that female students tend of have lower scores than male students, and that both male and female Fine Arts students tend of have lower scores than any other group, the male and female Advertising Arts students having the highest scores.

Premsia (Factor I) refers to "sensitiveness" and "effeminateness." Cattell also describes it as "acting on sensitive Intuition." Here again there are effects both for sex and field of specialization. As might be expected, the female art students have higher scores than the males. But again what is more important than these sex differences is that there seem to be differences also among the fields of specialization both for males and females, the Fine Arts students of both sexes being more "sensitive," the Advertising Arts students less so.

To describe autia (Factor M) Cattell uses such terms as "bohemian introverted," "unconventional," "interested in art, theory, and basic beliefs," "imaginative," "creative," "frivolous," "immature in practical judgment." Here there seems to be no difference for sex, but a significant effect is found for fields of specialization. Fine Arts students tend to have the higher scores, Advertising and Industrial Arts students the lower scores.

Shrewdness (Factor N) is described by such terms as "polished," "socially alert," "emotionally disciplined," "ambitious." Here the main effect is by field of specialization, the Fine Arts students having the lower scores, the Industrial and Advertising students the higher scores

TABLE 4.07

ANALYSIS OF VARIANCE: PERSONALITY (16PF)--MEANS AND "F" VALUES[a]

	N.	Factors														
		A	C	E	F	G	H	I	L	M	N	O	Q_1	Q_2	Q_3	Q_4
								Male								
F.A.	35	6.28	13.28	13.54	11.83	10.60	10.23	11.14	10.48	15.26	9.66	11.28	10.74	13.54	9.34	14.46
A.E.	12	8.50	14.58	13.00	11.17	11.92	11.83	10.50	8.92	14.75	11.00	10.83	11.17	14.67	10.58	12.75
A.D.	16	9.19	13.44	14.50	15.25	12.62	12.19	8.62	10.87	13.87	10.87	13.00	10.12	12.62	9.31	14.31
I.A.	23	7.78	15.30	15.00	12.78	11.35	11.48	10.61	9.65	13.74	11.13	10.69	10.00	13.13	10.61	14.39
								Female								
F.A.	44	8.13	14.48	13.48	13.34	8.73	12.23	12.52	10.16	16.66	8.43	11.34	11.16	14.34	8.61	14.41
A.E.	15	9.67	13.27	11.67	11.40	10.00	11.07	11.80	8.80	15.13	10.00	11.87	10.60	13.27	8.67	13.80
A.D.	7	10.43	16.28	12.43	12.57	12.00	13.00	10.43	6.14	13.57	12.43	8.28	10.43	11.86	10.86	10.43
I.A.	27	9.48	13.37	12.55	13.52	10.74	12.44	11.48	9.30	14.52	10.41	11.81	9.67	12.44	10.74	13.85
								"F" Value Effects								
Sex		13.57[b]	.03	4.57	1.01	9.17[c]	2.21	14.75[b]	3.52	3.50	3.88	.00	.01	.09	.97	.40
Major		5.48[b]	.12	1.16	2.61	6.41[b]	.38	6.14[b]	2.23	5.37[c]	8.67[b]	.03	1.85	2.75	4.14[c]	.67
Interaction		.12	2.78	1.24	1.39	.62	.51	.48	3.63[d]	.48	1.69	3.13	.29	1.18	1.73	1.14

[a] The Mean Squares and Sum of Squares for this table are reported in Appendix D.05.

[b] p = .001. [c] p = .01. [d] p = .05.

Key: F.A. = Fine Arts A.E. = Art Education A.D. = Advertising I.A. = Industrial Arts

Factors: For the description of factors see Cattell, R. B., & Stice, G. F., Handbook for the Sixteen Personality Factor Questionnaire, IPAT, Champaign, Ill., 1962 Supplementation.

Self-sentiment (Factor Q_3) refers to "conformity to socially accepted behavior," "self-control," "foresight," "exacting will-power." The main effect is by field of specialization, the Fine Arts students having the lower scores, the Industrial and Advertising Arts students the higher scores.

The effects by field of specialization conform to expectations. As in the case of Values, the findings seem reasonable. Relative to other art students, the Fine Arts student presents the following personality profile: he is more aloof and withdrawn, he has less rigid internal standards, he is more sensitive, effeminate, imaginative, and natural, and he is less self-controlled. Found most frequently at the other extreme with respect to these characteristics are the Advertising Arts students.

When a factor analysis of all the variables was performed for the core group of 179 students--to be discussed in detail in a subsequent chapter--the largest factor that emerged included five of the six variables showing the significant specialization effects (Table 4.07) plus the Aesthetic and Economic values, which also showed significant specialization effects (Table 4.06). These seven traits seem to constitute a crucial constellation for the personality of the art student; they differentiate art students from other college students, and they differentiate art students who are in different fields of specialization within the single Art School itself.

6. Comparisons of Relationships among Cognitive, Perceptual, and Personality Variables

The cognitive, perceptual, and personality variables that we have been treating separately are in fact interrelated in many complex ways. Not only are students in the different fields of specialization significantly different in value- and personality-attributes, but the relationships among these variables and the cognitive and perceptual measures are often different depending on the students' sex and field. We shall have occasion to discuss this when we turn to the factor analysis and intensive examination of the intercorrelations. Here we wish to present only a number of illustrations of the complexities.

Consider, as a first illustration, Table 4.08, presenting the correlations between 16PF autia (imaginativeness, creativeness) and performance on the nine cognitive measures. For male Fine Arts students there seems to be a positive relationship between "imaginativeness and creativeness" by personality test and performance on the cognitive tests, a relationship that tends to be negative for female Fine Arts students.

Or, consider a second illustration, this time the relationship between the 16PF personality attribute ego-strength and the same cognitive measures. The relevant data are given in Table 4.09. We

TABLE 4.08

CORRELATIONS BETWEEN 16 PF FACTOR M (AUTIA) AND NINE COGNITIVE VARIABLES

Cognitive Variables	Fine Arts		Significance of Difference between Two rho's ("z" Test)
	Males N=35	Females N=44	
Unusual Uses	.30	−.13	.06
Brick Fluency	.41*	−.31*	.001
Brick Flexibility	.29	−.15	.10
Ideational Fluency	.14	.13	N.S.
Object Question	.20	−.07	N.S.
Word Association Fluency	.39*	−.16	.01
Word Association Flexibility	.34*	−.11	.05
Wonderlic I.Q.	.25	−.21	.05
16 PF I.Q.	.02	.23	N.S.

*p = .05

TABLE 4.09

CORRELATIONS BETWEEN 16 PF FACTOR C (EGO-STRENGTH) AND NINE COGNITIVE VARIABLES

Cognitive Variables	Fine Arts		Applied Arts	
	Males N=35	Females N=44	Males N=39	Females N=34
Unusual Uses	$.24^{a}$	−.05	.15	$-.25^{a'}$
Brick Fluency	.00	$-.16^{b}$	$.31^{b'}$	−.15
Brick Flexibility	$.33^{c}$	.10	.04	$-.30^{c'}$
Ideational Fluency	.01	−.12	−.02	.06
Object Question	.03	−.11	−.04	−.28
Word Association Fluency	$.31^{d}$	.11	−.08	$-.17^{d'}$
Word Association Flexibility	$.61^{***e}$	$.17^{e'}$	$-.15^{e'}$	$-.08^{e'}$
Wonderlic I.Q.	$.47^{***f}$	$.02^{f'}$	$-.20^{f'}$	.12
16 PF I.Q.	.20	.17	−.07	.22

***p = .001

Note.--The differences between correlation coefficients marked a & a'; b & b', etc. are significant at the .05 level or above.

observe that male Fine Arts students with high ego-strength tend to perform better on the cognitive tests, especially on the general intelligence tests--a tendency not found for any of the other groups.

Not only are there different patterns in the relations between personality and cognitive performance depending on the sex and field of specialization of the students, but the pattern of relationships among the cognitive tests themselves is different for students specializing in different fields. Table 4.10 presents correlations between the Wonderlic Intelligence Test and the other cognitive and perceptual tests for the male Fine Arts and the male Applied Arts students.

TABLE 4.10

CORRELATIONS BETWEEN WONDERLIC INTELLIGENCE TEST, AND COGNITIVE AND PERCEPTUAL VARIABLES

Variables	Fine Arts Males N-35	Applied Arts Males N=39
Cognitive		
Unusual Uses	.38*	.19
Brick Fluency	.31	.28
Brick Flexibility	.40*	.32*
Ideational Fluency	.37*	.40*
Object Question	.17	.26
Word Association Fluency .	.56***	.40*
Word Association Flexibility	.65***	.47**
16 PF I.Q.	.24	.48**
Perceptual		
Spatial Visualization . .	.39*	.60***
Hidden Shapes	.36*	.42**
Matches	.01^{a}	.43**$^{a'}$
Perceptual Memory (Errors)	-.02^{b}	-.47**$^{b'}$
Welsh Figure-Judgment . .	.01	-.22

*p = .05 **p = .01 ***p = .001

Note.--The differences between correlation coefficients marked as a & a', b & b', are significant at the .05 level or above.

Two differences in the relationships for the two groups seem particularly noteworthy: (1) Although there is a significant positive correlation between the Wonderlic Intelligence Test and the 16PF Intelligence Factor of the male Applied Arts students, no significant positive correlation is found for the male Fine Arts students; (2) Although there are strong positive correlations between the

Wonderlic and the perceptual tests for the Applied Art students, the correlations are much more tenuous for the Fine Arts students, and indeed on Matches and Perceptual Memory, there are significant differences between the correlations for the two groups.

7. Summary and Discussion

What is most apparent from the data is that there are profound differences within the sample of art students--differences that can be attributed to the students' specific area of specialization within the general field of art. When the differences are examined closely, it appears the greatest variations are along the value and personality dimensions rather than, as might have been anticipated, in the cognitive or perceptual dimensions. Three of the six values and six of the 15 personality factors show significant effects due to field of specialization; none of the 21 cognitive and perceptual dimensions show such effects. With respect to the latter, however, it should be noted that there are certain cross-sex, cross-field trends bearing further study.

There are other and hitherto largely unidentified complexities in the study of creativity, for not only are there certain differences by sex and field of specialization in values and personality, but in the nature of the interaction between the personality and the cognitive attributes. For example, the more imaginative male Fine Arts students tend to perform better on cognitive tests, but the more imaginative female Fine Arts students tend to perform less well on these tests. Ego-strength and intelligence are very significantly related for male Fine Arts students, but unrelated for male Applied Arts students. Within the cognitive domain itself there are different intercorrelations by field of specialization. Thus, intelligence and performance on Guilford's Match problems are unrelated for male Fine Arts students but significantly related for male Applied Arts students. Recall of visual stimuli is uncorrelated with intelligence for male Fine Arts students, but significantly correlated for male Applied Arts students.

Perhaps the most notable observation is that virtually all the values and personality variables differentiating art students in general from other college students also differentiated within the art student group itself students in one field of specialization from those in another field of specialization. We may have then in these variables, subject of course to further study, a syndrome which may be termed "creative" or more specifically, "artistic" personality characteristics--that is, low Economic and high Aesthetic values, lack of sociability, low superego, high sensitivity, high imaginativeness, lack of shrewdness, and lack of concern for social norms. Fine Arts students seem to possess to an extreme degree these characteristics. In Chapter VI we shall study this group in greater detail.

CHAPTER V

RESULTS III: ON THE RELATIONSHIP AMONG THE VARIOUS CRITERIA OF CREATIVITY

1. Introduction

Two salient findings thus far are: (1) although art students as a group do not differ from relevant age and sex norms in cognitive functioning, they differ sharply in values and personality traits from all other groups of similar age, sex and education; and (2) more important, perhaps, despite these differences between art students as a group and other student groups, there are also sharp differences among the several sub-groups constituting the total art group--differences that are in some instances no less than those between the total art group and the norms.

In the present chapter we pause in our study of the subjects themselves to raise a crucial question suggested by these observations: what is the relationship among the various criteria of creativity currently in use?

Up to this point we have skirted this issue of the criterion of creativity. No comparison has been made between students who were supposed to be more or less creative on any of the commonly used criteria of creativity. Assuming that we did want to make such a comparison, which criterion should be applied? The personality tests? the intelligence tests? the divergent thinking tests? the art grades? the ratings? Artists of the past, for example, can be evaluated against an ultimate criterion of fame; contemporary artists could be assessed against an operational, if by no means foolproof, criterion of critical recognition or price commanded by their products. But what about students?

It seemed at the beginning of our investigation that although the question of relative creativity of students is an almost unanswerable problem elsewhere--for instance, in schools of medicine or business --it should not be a difficult problem in a school of art. In no other domain is creativity so obviously an issue as in art school. Accordingly we felt that here, if anywhere, the direct evaluation of the students by artist-teachers would be self-evidently expert and experimentally usable. Indeed, what could be a more acceptable criterion of potential creativity than the achievement of art students in an art school over a two-year period?

Happily, as we have already seen, just the measures we thought we could use without further question were already at hand in the School. At the end of each semester, in addition to the course grades, every teacher rates his students on originality and artistic potential. By averaging these ratings for the students' first year, a composite

Originality and Artistic Potential score (OAP-1) was derived; by averaging the ratings for the next year, a second score (OAP-2) was obtained.

These scores seemed initially an excellent working criterion of creativity for our subjects. Each rating was founded on a thorough familiarity of the work of the students by at least four artist-teachers--a familiarity acquired by observing the students in the studios for at least a year. The ratings, as we have already said, were made seriously since they became part of the students' permanent record, and not made just to comply with some researcher's requirements. And of course ratings by experts have been used for criterion purposes in other studies of creativity.

There was also another relevant and commonly used measure of creativity in the student files, the grades in art courses given by the same teachers who had made the ratings. Surely, the grade-point average based on the formal evaluations of student performance over a period of two years might be as viable a criterion of creativity for research purposes as it is in the school situation itself. And here again, just such measures have been used in numerous studies of creativity

The ratings and grades, in short, had an appealing face validity. But as soon as the analysis of the data was begun, a puzzling set of relationships emerged. Table 5.01 presents a number of these relationships. For example, the correlation between the ratings for the two years, although significantly positive, was quite low ($r = +.32$). While some unreliability was anticipated, the dimensions, i.e., Originality and Artistic Potential, on which the ratings were made were expected to have a rather more common meaning in art school than elsewhere. What is more, the correlations between the ratings for each of the two years and the grades were +.41 and +.31. This too was quite surprising, for although again significantly positive, these relationships are quite low if one considers that the same teachers rated the students and graded their work, and they ordinarily did this at the same time. If the ratings of originality and artistic potential are not based on performance in class, on what are they based?

Further, when the sample was divided by sex and field of specialization, other unexpected relationships emerged. For example, for female Fine Arts students the correlation between OAP-1 and OAP-2 on the one hand, and Art Grades on the other are +.60 ($p = .001$) and +.49 ($p = .001$) respectively, but for male Fine Arts students they are +.29 (n.s.) and +.22 (n.s.). If the lack of correlations between the ratings and the academic grades are reasonble, the lack of correlation between the two measures of creativity for all sub-groups is puzzling. Moreover, the pattern of relationships between academic grades and art grades, from +.24 (n.s.) for male Fine Arts students to +.62 ($p = .001$) for female Applied Arts students also raises a number of questions about the nature of the criteria of creativity.

These observations suggest that creativity as evaluated even in

TABLE 5.01

CORRELATIONS BETWEEN ACHIEVEMENT CRITERIA IN ART SCHOOL: TEACHERS' RATINGS OF CREATIVITY (OAP-1, OAP-2), ART, AND ACADEMIC GRADES

Correlations between	A.	B.		C.			
	For the Core Sample (N=179)	For the Core Sample Divided by Sex		For the Core Sample Divided by Sex and Field of Specialization (27 Art Education Students Excluded)			
				Male		Female	
		Males (N=86)	Females (N=93)	Fine Arts (N=35)	Applied Arts (N=39)	Fine Arts (N=44)	Applied Arts (N=34)
OAP-1 and OAP-2	.32***	.33**	.32***	.35*	.20	.52***	.23
OAP-1 and Art Grades	.41***	.35**	.48***	.29	.27	.60***	.25
OAP-2 and Art Grades	.31***	.18	.42***	.22	-.09	.49***	.49**
OAP-1 and Acad. Grades	.11	.08	.17	-.11	.07	.26	-.06
OAP-2 and Acad. Grades	.10	.05	.13	-.08	.04	.19	.25
Art and Academic Grades	.45***	.35**	.53***	.24	.38*	.51***	.62***

*p = .05 **p = .01 ***p = .001

art school may refer to different constructs, depending on a number of factors, including whether the students are being rated or their work graded, whether they are male or female, and whether they are in one field of specialization or another. If these most self-evident of criteria, which are so often taken for granted in the study of creativity, do not provide a unitary index, what about the overlap among the other frequently used measures? And so the question to which this chapter is devoted: What is the relationship among the commonly applied criteria of creativity?

2. The Commonly Used Criteria of Creativity

The following are the five most commonly used criteria of creativity:

i) Achievement. It is assumed that creativity is a high-level mental function, and therefore it should be reflected in superior achievement. With respect to individuals of school age, when achievement in other subjects appears less applicable, achievement in art courses seems a "natural" measure of creativity that can be used as a criterion.

In our study, this criterion was represented by the grades received in the art courses (exclusive of academic courses like history or literature). These grades were tabulated and converted into grade-point averages on a scale from 12 (A) to 0 (F).

ii) Ratings. It is assumed that a competent person who has had an opportunity to observe another person can provide a sound judgment of his inventiveness or originality. Accordingly, confidence is placed in the evaluations of creativity by peers, supervisors, or teachers, and these are used as a criterion. As already indicated, the student files contained ratings given by the artist-teachers in Originality and Artistic Potential. These ratings were on a scale ranging from 1 to 4. Two scores were derived: a) OAP-1, an additive score based on the two ratings, averaged from the ratings of four teachers, at the end of one year; b) OAP-2, the similarly computed score for the second year.

iii) Intelligence. Intelligence test performance is the single most widely used and best validated index of mental functioning. Presumably, creativity is a mental function, and therefore the superior IQ may be used as a criterion. In the present study, two instruments of this kind were given: a) Wonderlic, representing an adult-level IQ test of the traditional sort (Wonderlic, 1961); b) the Cattell 16PF, Factor B (Cattell, 1962).

iv) Divergent thinking. Recently, a distinction has been made between convergent thinking and divergent thinking, the latter presumably being a substratum of creativity. Performance on divergent thinking tests may therefore be used as a criterion. Several of the more widely used instruments found in studies of creativity were given in this study. For the most part these were divergent thinking tests, although a number of convergent thinking and other measures were included as follows:

a. Unusual Uses (Guilford, 1951, 1963)
b. Brick Uses - Fluency (Guilford, 1951, 1962)
c. Brick Uses - Flexibility (Guilford, 1951, 1962)
d. Thing Catagories - Ideational Fluency (Guilford, 1960)
e. Object Question Test (Burkhart and Bernheim, 1963)
f. Word-Associations - Flexibility (Guilford, 1960; Getzels and Jackson, 1962)
g. Spatial Visualization (Guilford-Zimmerman, 1956)
h. Hidden Shapes (Cattell, 1958)

v) Personality. Personality attributes are evaluated in relation to an empirically derived or an a priori profile of the "creative personality," and the closeness of the fit is used as a criterion. Two of the tests most widely used in this context were given: a) 16 Personality Factors (Cattell, 1962); b) The Study of Values (Allport-Vernon-Lindzey, 1960).

All instruments listed above have logical and empirical claims as indices of creativity. According to current usage of the term, there was no reason to expect that the several separate criteria should not overlap at least in some degree. That is, the rating given by the teachers should be in some agreement with the grades in art courses, which in turn should agree with the measures of intelligence and divergent thinking, and so on. In short, significant relationships among the various criteria of creativeness were expected.

3. Factor Analysis of All Variables for the Core Sample

Although the "art student" sample can be analyzed into further discrete groupings, it is also true that the sample as a whole is very different from normal college populations. It is therefore consistent to begin our factor analysis by considering the total group of art students who took every test. The specific question to which an answer was sought through factor analysis was: will the instruments purporting to measure different facets of creativity (i.e., divergent thinking, ratings and grades, creative personality traits, etc.) cluster together as one factor, or will they load on specific factors?

The answer to this question is given by the factor loadings presented in Appendix D.06.[1] The previously described criterion variables tend to cluster in four factors, which can for convenience be labelled "creative personality," "divergent thinking," "general intelligence," and "artistic performance." Table 5.02 extracted from the total matrix given in the Appendix presents the relevant data regarding those criterion factors. We may begin by examining these factors in somewhat greater detail, leaving reference to the non-criterion factors for later.

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[1] The factor analytical method on which the data discussed in this chapter is based, is that of Image Covariance Analysis. The reason that this particular factoring was chosen for reporting is that, in comparison with other factor analytical methods attempted, it provided the

a) Factor I, "creative personality"

The first factor to emerge brings together a cluster of personalistic traits which have by now become familiar. These are low Economic value, high Aesthetic value, low superego, high sensitivity, high imaginativeness, low shrewdness, and low concern for social acceptance. These are among the variables that showed the largest differences between the art group and general college norms, and within the art group itself among the various fields of specialization (Table 4.07). It may be noted that low Economic and high Aesthetic values were found by MacKinnon (1959) as characteristic of creative architects and researchers. The 16PF factors of sensitivity, imaginativeness and lack of shrewdness were included in Cattell's index of general creativity (IPAT, 1963). Low superego and low self-sentiment, which are not included in the Cattell index, may then be specific variables related to creativity in art students only, flexible internal standards and unconcern for social acceptance certainly being reasonable chracteristics for an artist.

b) Factor II, "divergent thinking"

The instruments loading high on Factor II were the Unusual Uses, Brick Uses, Ideational Fluency (Thing Categories), and Object Question Test, all designed to measure divergent thinking. Academic grades loaded relatively high on this factor, but they loaded equally high on two other factors, and therefore could not be counted as belonging exclusively to any one factor. The Word Association (Flexibility) and Wonderlic IQ tests also appeared in this factor, but had higher loadings on Factor V; they were therefore counted in the latter factor.

c) Factor V, "general intelligence"

The instruments loading highest on Factor V conform in part to what in Guilford's terms might be called "convergent thinking" tests. Brought together are Word Associations (Flexibility), Wonderlic IQ, 16 PF Intelligence factor, and two tests which had previously been included

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most clear-cut results. We do not propose to base elaborate interpretations on its results; the factor pattern will be used only as a suggestive basis for grouping variables. In general, however, the Image Covariance Analysis, the Principal Component analysis, and still other methods of factoring the data all agreed in grouping the variables in essentially the same clusters. For a discussion of the theory and method of Image Covariance Analysis, see Guttman (1953, 1960) and Kaiser (1963).

TABLE 5.02

FACTOR LOADINGS AND COMMUNALITIES OF CREATIVE CRITERION VARIABLES IN A SAMPLE OF 179 ART STUDENTS (IMAGE COVARIANCE ANALYSIS)

	Loading of variable on rotated factor	Estimated communality of variable (Multiple R)	Computed communality—variance accounted for by factor analysis (15 factors)
Factor I			
(Creative Personality)			
Economic Value (AVL)	-.63	.86	.83
Aesthetic Value (AVL)	.54	.89	.85
Superego (16 PF-G)	-.54	.47	.39
Premsia (16 PF-I)	.47	.48	.40
Autia (16 PF-M)	.50	.40	.33
Shrewdness (16 PF-N)	-.49	.36	.32
Self-Sentiment Formation (16 PF-Q$_3$)	-.50	.55	.50
Factor II			
(Divergent Thinking)			
Unusual Uses	.67	.61	.55
Brick Uses (Fluency)	.66	.64	.61
Brick Uses (Flexibility)	.69	.65	.59
Ideational Fluency	.46	.34	.26
Object Question	.37	.36	.29
Factor V			
(General Intelligence)			
Word Association (Flexibility)	.58	.77	.71
Wonderlic IQ	.46	.59	.51
Intelligence (16 PF-B)	.51	.41	.33
Spatial Visualization	.51	.53	.48
Hidden Shapes	.36	.39	.33
Factor VI			
(Artistic Performance)			
Rating OAP-1	.45	.40	.29
Rating OAP-2	.40	.38	.28
Art Grades	.62	.50	.45

in the perceptual category: Spatial Visualization and Hidden Shapes.

d) Factor VI, "artistic performance"

The measures loading highest on this factor are the art grades and the two creativity ratings. The factor seems clearly to represent the students' artistic achievement in the School.

It is evident that the factor analysis has grouped the variables in factors corresponding to the a priori classifications with which we began. Instead of arriving at a factor combining cognitive, personalistic, and achievement dimensions of creativity, the analysis provided separate clusters of variables, each one consistent with a major approach to the study of creativity. As was expected, the two ratings and the art grades do appear in the same factor, since both are measures of achievement in art school; otherwise there is not much overlap among the various criteria. What were expected to be four different ways of measuring the same phenomenon, measure for the most part only discrete facets of it, and perhaps do not refer to anything like a unitary phenomenon at all.

Before turning to a more detailed examination of the relationships among the four criteria, we may comment briefly on the remaining factors. Factor III (see Appendix D.06) brings together the Ego Identity score on the Semantic Differential test and 16 PF factor C, ego-strength. Negative loadings appear in guilt and ergic tension, that is, unresolved Id drives. This cluster of variables is to a certain extent a shadow-image of the first factor. Factor IV includes cyclothymia, dominance, surgency, and parmia--personality variables related to extroversion and dominance. We have seen elsewhere that male art students are relatively lower in these characteristics than are female art students. Factor VII includes Theoretical value, radicalism, and self-sufficiency--variables that on theoretical grounds should belong to the "creative personality" cluster of Factor I, but represent perhaps a more intellectual approach to experience than the one outlined in that factor. The structure of the remaining factors does not suggest anything useful. Either only one item loads highly (as in factors 8, 9, 13), or none does.

4. Relationship among the Criterion Measures

We proceed now to a more detailed and stringent analysis of the relationships among the criterion variables. The zero-order correlations among the variables will be presented, and the analysis will be based on these rather than on factor loadings, to avoid ambiguities resulting from interpretation of the factors.

The specific issue raised initially was: What is the relationship among the commonly used criteria of creativity, at least as represented by the variables and subjects of this study? What, for example, is the relationship between "creative personality" measures and "divergent thinking" measures? Between "general intelligence" measures and "art performance" measures?

TABLE 5.03

INTERCORRELATION OF VARIABLES GROUPED BY FOUR CRITERION FACTORS. N: 179 ART STUDENTS

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Factor I[a]																				
1. Economic Value (-)	—	.42*	.20*	.42*	.32*	.33*	.24*	.10	.09	.11	.05	.23*	.07	.01	.14	-.10	-.01	.17*	.11	.23*
2. Aesthetic Value		—	.27*	.38*	.37*	.26*	.24*	.14	.14	.23*	.10	.30*	.16*	.10	.15*	.00	.01	.07	.20*	.21*
3. Superego (-)			—	.23*	.28*	.36*	.51*	.05	.18*	.17*	.06	.25*	.03	.09	.00	-.03	-.08	-.04	.11	.05
4. Premsia				—	.34*	.31*	.31*	-.08	.03	.09	.01	.08	.11	.08	.07	-.15*	-.07	.03	.20*	.13
5. Autia					—	.31*	.36*	.09	.08	.17*	.02	.19*	.12	.03	.01	-.09	-.13	-.03	.17*	.06
6. Shrewdness (-)						—	.43*	.01	.10	.08	-.06	.19*	.02	-.03	.05	-.05	-.05	.01	.09	.01
7. Self-Sentiment (-)							—	-.02	.15*	.06	.00	.14	.06	.04	-.02	.04	-.05	.05	.09	.01
Factor II																				
8. Unusual Uses								—	.52*	.56*	.37*	.29*	.37*	.25*	.17*	.13	.19*	-.01	-.06	.04
9. Brick (Fluency)									—	.68*	.35*	.31*	.26*	.23*	.03	-.06	.16*	.00	.00	.02
10. Brick (Flexibility)										—	.29*	.39*	.36*	.33*	.13	.02	.15*	.01	.10	.06
11. Ideational Fluency											—	.17*	.35*	.28*	.07	.12	.18*	.03	-.01	.09
12. Object Question												—	.23*	.24*	.08	.02	.14	.01	.03	.15*
Factor V																				
13. Word Assoc. (Flexibility)													—	.55*	.28*	.34*	.27*	.03	-.03	-.04
14. Wonderlic I. Q.														—	.38*	.41*	.37*	-.05	.05	.12
15. Intelligence (16 PF)															—	.23*	.22*	.14	.03	.01
16. Spatial Visualization																—	.42*	.05	.14	.01
17. Hidden Shapes																	—	.04	.10	.07
Factor VI																				
18. Rating OAP-1																		—	.32*	.41*
19. Rating OAP-2																			—	.31*
20. Art Grades																				—

[a] The sign of correlations with variables: Economic Value, Superego, Shrewdness, and Self-Sentiment has been reversed, since they loaded in an opposite direction from the other variables on Factor I.

*Significant correlations.
rho: .15 - .21 at the .05 level.
.22 - .26 at the .01 level.

The matrix of intercorrelations is given in Table 5.03, and Table 5.04 provides a summary of the proportion of measures correlating at least at the .05 level. As expected, the variables within each factor correlate significantly, but even so, several of the relationships are lower than might be anticipated. Noteworthy among these are the ratings and grades, about which we have already remarked, and the Wonderlic and the 16 PF (B), both purporting to measure intelligence, but only correlating .38.

TABLE 5.04

PROPORTION AND PERCENTAGE OF VARIABLES CORRELATING SIGNIFICANTLY AND IN PREDICTED DIRECTION (.05 LEVEL AND BELOW) BETWEEN THE FOUR CRITERION FACTORS
(This is a summary of Table 5.03)

Criterion Factors	N. Variables in Factor	I	II	III	IV
I. Creative Personality	7	21/21 (100%)			
II. Divergent Thinking	5	10/35 (29%)	10/10 (100%)		
III. General Intelligence	5	2/35 (6%)	15/25 (60%)	10/10 (100%)	
IV. Artistic Performance	3	6/21 (29%)	1/15 (7%)	0/15 (0%)	3/3 (100%)

The variables in the two thinking or cognitive factors, "divergent thinking" and "general intelligence" are, as expected, more highly related than any of the other sets of variables. The Wonderlic correlates with each of the variables in Factor II ("Divergent Thinking"), and the Word Association test, which in the present analysis falls into Factor V ("General Intelligence") but is often classified as a divergent thinking test, also correlates with each of the variables in Factor II. Even here, however, one of the general intelligence tests does not correlate with any of the divergent thinking tests, and another is related significantly to only one of the divergent tests, and then the correlation is but +.17. This is the 16 PF Intelligence factor, and in this connection, it is interesting to note that three of the personalistic 16 PF dimensions are more highly related to divergent thinking than is the 16 PF Intelligence dimension. As for the relation of either general intelligence or divergent thinking to art performance, not one of the five general intelligence variables and only one--and then just barely--of the divergent thinking variables correlate significantly with any of the art performance variables.

With respect to the central inquiry then, i.e., the nature of the relationship among the commonly used measures of creativity, the salient observation is that the matrix as a whole does not show the number or magnitude of correlations that should appear if the variables were measuring a similar phenomenon. The measures that show any promise at all of cutting across to other criteria are to be found in the Creative Personality factor. However slightly, these measures do relate to both divergent thinking and to performance in art school. Aesthetic value, for example, relates to two of the divergent thinking tests and to two of the three art performance variables; autia relates to two of the divergent thinking tests and to one of the art performance variables; low superego relates positively to three of the five divergent thinking variables. In sum, as Table 5.04 indicates, none (0%) of the 15 possible correlations between general intelligence and art performance, and only one (7%) of the 15 possible correlations between divergent thinking and art performance is significant at the .05 level; six (29%) of 21 possible correlations between creative personality and art performance are significant, and , although only two (6%) of 35 possible correlations between general intelligence and creative personality are significant, ten (29%) of the possible correlations between creative personality and divergent thinking are significant. But we must point out again that if perhaps promising, all the relationships are slight--none of the correlations exceeds +.30 and more often they are closer to +.15.

5. Relationships among Criterion Measures Within Sub-samples

A factor analysis was also performed for the male and female students separately (Appendix D.07 and D.08). Although the requirements concerning the ratio of number of subjects to number of variables was met, there is reason to doubt the reliability of factor analytical results obtained from groups of this size; therefore, the results of this analysis are purely suggestive.

The major difference between the factors obtained for the total core sample and those obtained for the two sex-groups, is the partial disappearance of the "Creative Personality" factor in the latter analysis. The cognitive factors of "Divergent Thinking" and "General Intelligence" reappear for both male and female groups as do the personality factors of "Ego-strength" and "Dominance." For female students there is an "Artistic Performance" factor on which the ratings and grades load highly; for males the same factor presents much more tenuous relationships. The "Creative Personality" factor, which was so prominent when the total sample was analyzed, seems to account for far less of the variance when the group is divided by sex. Only four of the original seven variables cluster together for the male students (Factor V); for females, this factor

TABLE 5.05

INTERCORRELATIONS OF VARIABLES GROUPED BY FOUR CRITERION FACTORS. N = 86 MALE ART STUDENTS

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Factor I^a																				
1. Economic Value (-)	—	.44*	-.11	.44*	.39*	.29*	.20	.07	.01	.07	-.01	.14	-.03	-.09	.16	-.13	.00	.33*	.24*	.41*
2. Aesthetic Value		—	.24*	.46*	.42*	.25*	.18	.06	.02	.13	-.01	.32*	.13	.06	.14	-.06	-.10	.10	.27*	.20
3. Superego (-)			—	.13	.28*	.23*	.49*	.01	.19	.16	.06	.16	.02	.04	-.14	.05	-.11	.13	.14	.15
4. Premsia				—	.40*	.26*	.24*	-.09	.07	.09	-.04	.07	.04	.05	.09	-.10	-.10	.19	.33*	.25*
5. Autia					—	.19	.37*	.14	.17	.20	.00	.22*	.29*	.08	-.06	-.01	-.09	.03	.27*	.05
6. Shrewdness (-)						—	.41*	-.05	.10	-.03	-.08	.02	.02	-.07	.02	.01	-.01	.11	.15	-.03
7. Self-Sentiment (-)							—	-.07	.12	.04	.03	.08	.14	.05	.01	.08	-.09	.28*	.14	.07
Factor II																				
8. Unusual Uses								—	.44*	.54*	.38*	.23*	.35*	.21	.20	.13	.23*	-.02	.03	.05
9. Brick Fluency									—	.63*	.49*	.25*	.23*	.23*	-.15	-.12	.28*	-.04	.06	.04
10. Brick Flexibility										—	.41*	.30*	.33*	.28*	.00	-.06	.14	-.02	.12	.01
11. Ideational Fluency											—	.12	.26*	.34*	.12	.04	.19	.02	-.01	.10
12. Object Question												—	.16	.16	.01	.02	.17	-.04	.07	.10
Factor V																				
13. Word Assoc. (Flexibility)													—	.53*	.27*	.41*	.22*	-.07	.15	-.09
14. Wonderlic I. Q.														—	.32*	.48*	.36*	.03	.17	.05
15. Intelligence (16 PF)															—	.32*	.29*	.15	.15	.15
16. Spatial Visualization																—	.34*	-.02	.12	-.21
17. Hidden Shapes																	—	.07	.19	.02
Factor VI																				
18. Rating OAP-1																		—	.33*	.35*
19. Rating OAP-2																			--	.18
20. Art Grades																				—

[a] The sign of correlations with variables: Economic Value, Superego, Shrewdness, and Self-Sentiment has been reversed, since they loaded in an opposite direction from the other variables on Factor I.

*Significant correlations.
rho: .22 - .27 at the .05 level.
.28 - .35 at the .01 level.

TABLE 5.06

INTERCORRELATION OF VARIABLES GROUPED BY FOUR CRITERION FACTORS. N = 93 FEMALE ART STUDENTS

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Factor I[a]																				
1. Economic Value (-)	—	.39*	.24*	.33*	.19	.36*	.26*	.15	.20*	.12	.16	.31*	.14	.11	.11	.01	-.04	.03	-.02	.04
2. Aesthetic Value		—	.28*	.27*	.30*	.26*	.29*	.25*	.26*	.31*	.22*	.26*	.17	.13	.16	.09	.11	.01	.14	.20
3. Superego (-)			—	.22*	.22*	.41*	.53*	.14	.19	.14	-.09	.30*	.01	.14	.12	.08	-.02	-.17	.09	-.07
4. Premsia				—	.20*	.29*	.36*	-.07	-.03	.02	.13	.01	.15	.11	.05	-.04	-.02	-.08	.08	-.02
5. Autia					—	.37*	.33*	.04	-.02	.11	.07	.12	-.05	-.03	.06	-.07	-.19	-.05	.09	.05
6. Shrewdness (-)						—	.44*	.09	.09	.14	-.03	.31*	-.01	.00	.07	.01	-.09	-.03	.04	.02
7. Self-Sentiment (-)							—	.01	.17	.05	-.02	.16	-.04	-.01	-.07	.00	-.06	-.14	.06	-.09
Factor II																				
8. Unusual Uses								—	.65*	.62*	.36*	.37*	.41*	.30*	.15	.10	.10	.00	-.16	.04
9. Brick (Fluency)									—	.73*	.20*	.36*	.29*	.23*	.08	-.02	.01	.04	-.07	.00
10. Brick (Flexibility)										—	.19	.47*	.38*	.38*	.24*	.17	.18	.05	.09	.09
11. Ideational Fluency											—	.25*	.27*	.22*	.02	.17	.17	.02	-.02	.09
12. Object Question												—	.27*	.30*	.14	.09	.10	.10	.00	.19
Factor V																				
13. Word Assoc. (Flexibility)													—	.56*	.29*	.36*	.29*	.01	-.17	-.01
14. Wonderlic I. Q.														—	.42*	.40*	.38*	-.12	.04	.18
15. Intelligence (16 PF)															—	.18	.15	.14	-.05	.09
16. Spatial Visualization																—	.48*	.06	.22*	.27*
17. Hidden Shapes																	—	.02	.03	.12
Factor VI																				
18. Rating OAP-1																		—	.32*	.48*
19. Rating OAP-2																			—	.42*
20. Art Grades																				—

[a] The sign of correlations with variables: Economic Value, Superego, Shrewdness, and Self-Sentiment has been reversed, since they loaded in an opposite direction from the other variables on Factor I.

*Significant correlations.
rho: .20 - .26 at the .05 level.
.27 - .34 at the .01 level.

structure disappears almost completely: traces of it can be found in Factor VII. Some of the variables that loaded high on the "Creative Personality" factor for the total core sample, now appear in other factors. Thus, shrewdness loads high on the Ego-strength factor for both males and females, superego loads on the same factor for females, and self-sentiment for males.

It is possible the "Creative Personality" syndrome that emerged in the total factor analysis is not descriptive of the students when the males and females are considered separately. The failure of this factor to materialize in the analysis by sex may have been due to the reduced sample size. In any case, in order to compare males and females on the same dimensions, we shall apply the factorial structure obtained from the analysis of the total sample to analyze the groups divided by sex.

Tables 5.05 and 5.06 present the correlation matrices of male and female students separately. These tables are summarized in Table 5.07 A and B. to indicate the observed sex differences. We see from Table 5.07 that the variables in the four criterion factors obtained from the total sample, tend to be correlated also when the sample is divided by sex. But in another respect, Table 5.07 is quite different from Table 5.04. In the latter Table we observed that the variables in the "Creative Personality" factor tend to correlate with both the "Divergent Thinking" and the "Artistic Performance" variables. When the sample is divided by sex, the Divergent Thinking variables do not correlate with Creative Personality variables for males, but they tend to do so for females. Conversely, Creative Personality variables tend to correlate with Artistic Performance variables for males, but not for females.

What about the relationships among criteria for the several fields of specialization? On the basis of the findings reported in the preceding chapter, it was felt that the correlations between the criterion factors might increase if the data for the groups defined by major were analyzed separately. This, however, turned out not to be the case. When the criterion variables were intercorrelated for the four sub-samples by sex and major, the relationships among the criteria tend to decline. What is more, even the correlations among the variables within each factor tended to decrease. This may be due to the decline in the number of cases and to the homogeneity of the scores within each group. However, a number of suggestive relationships between certain criterion variables for the groups defined by sex and field of specialization may be observed.

Table 5.08 (p. 79) presents the correlations between the "general intelligence" measures and the Art Grades when the sample is divided by sex and field of specialization. It is immediately apparent that although none of the correlations for the total sample exceeded +.12 (Table 5.03), one of the correlations now reaches +.36 ($p = .05$) and another +.52 ($p = .01$). More than this, differences between males

TABLE 5.07

PROPORTION AND PERCENTAGE OF VARIABLES CORRELATING SIGNIFICANTLY AND IN PREDICTED DIRECTION (.05 AND BELOW), BETWEEN THE FOUR CRITERION FACTORS--SAMPLE DIVIDED BY SEX

Criterion Factors	N. Variables in Factor	I. Creative Personality	II. Divergent Thinking	III. General Intelligence	IV. Artistic Performance
		A. Males			
I. Creative Personality	7	16/21 (76%)			
II. Divergent Thinking	5	2/35 (6%)	9/10 (90%)		
III. General Intelligence	5	1/35 (3%)	9/25 (37%)	10/10 (100%)	
IV. Artistic Performance	3	8/21 (38%)	0/15 (0%)	0/15 (0%)	2/3 (66%)
		B. Females			
I. Creative Personality	7	20/21 (95%)			
II. Divergent Thinking	5	9/35 (25%)	9/10 (90%)		
III. General Intelligence	5	0/35 (0%)	11/25 (44%)	8/10 (80%)	
IV. Artistic Performance	3	0/21 (0%)	0/15 (0%)	2/15 (13%)	3/3 (100%)

TABLE 5.08

CORRELATION BETWEEN ART GRADES AND GENERAL INTELLIGENCE VARIABLES SAMPLE DIVIDED BY SEX AND FIELD OF SPECIALIZATION

(27 Art Education Students Excluded)

General Intelligence	Art Grades			
	Male Fine Artists (N=35)	Female Fine Artists (N=44)	Male Applied Artists (N=39)	Female Applied Artists (N=34)
Word Association (Flexibility)	-.20	-.09	-.03	.17
Wonderlic IQ	-.01	.13	.18	.24
Intelligence (16 PF)	-.03	.16	.36*^{c}	-.12$^{c'}$
Spatial Visualization	-.32^{a}	.18$^{a'}$	-.02^{b}	.52**$^{a'b'}$
Hidden Shapes	-.11	.02	.11	.30

*p = .05 **p = .01

Note: The differences between correlation coefficients marked a & a'; b & b'; etc., are significant at the .05 level or above.

and females within field of specialization become manifest. Thus, the correlation between Spatial Visualization and Art Grades for male Fine Artists is -.32 and for female Fine Artists it is +.18; the correlation between Spatial Visualization and Art Grades for male Applied Artists is -.02 and for female Applied Artists it is +.52; the correlation between 16 PF Intelligence and Art Grades for male Applied Artists is +.36 and for female Applied Artists it is -.12. All these differences between rho's are significant at least at the .05 level. And finally, it may be observed that the correlation between Spatial Visualization and Art Grades for male Fine Artists is -.32 and for female Applied Artists it is +.52, a difference significant at the .001 level.

Again, consider Table 5.09 presenting the correlations between the Creative Personality measures and the Art Grades for the group of Fine Artists divided by male and female. For three of the measures there are significant sex differences in the correlations, the relationships tending in one direction for the males and in the reverse direction for the females. Thus, the correlation with Art Grades for low Economic value is +.47 for males, .01 for females; for low superego, the correlation is ±.30 for males, and -.26 for females; for low self-sentiment, it is +.28 for males, -.29 for females.

TABLE 5.09

CORRELATION BETWEEN ART GRADES AND CREATIVE PERSONALITY VARIABLES
COMPARISON BETWEEN MALE AND FEMALE FINE ARTS STUDENTS

Creative Personality Variables	Art Grades of Fine Artists		Significance of Difference between Two rho's ("z" Test)
	Male (N=35)	Female (N=44)	
Economic Value (-)	+.47**	+.01	.05
Aesthetic Value	+.27	+.19	N.S.
Superego (-)	+.30	-.26	.01
Premsia	+.21	-.12	N.S.
Autia	+.06	-.05	N.S.
Shrewdness (-)	-.17	-.16	N.S.
Self-Sentiment (-)	+.28	-.29	.01

**p = .01

In short, the nature of the relationships among criteria of creativity seem to be dependent on the sex and field of specialization of the subjects observed, and when subjects are taken as an undifferentiated group even when they are in a single art school, relationships that may in fact exist are likely to be "washed out." This raises not only the important methodological question of sampling but perhaps the more crucial substantive issue of why should there be differences in the relationship of cognition and personality to Art Grades between fields of specialization in art and between prospective male and female artists.

6. The Use of Artistic Performance as the Ultimate Criterion of Creativity

The analyses in the preceding section indicate that the available instruments, all purported to measure creativity, do not in fact agree in measuring a unitary behavioral pattern. Most of the indices of creativity fail to overlap; for instance, an individual who would be considered creative on the basis of his performance on intelligence or divergent thinking tests, would not necessarily be recognized as creative by his teachers in the School. While reserving the discussion of this state of affairs to the last section of this chapter, we intend in the present section to select Artistic Performance as a tentative criterion, and to study its relationships to all the other variables. Artistic Performance consists of the two teacher ratings of creativity (OAP-1 & OAP-2), and of Art Grades. By selecting these three variables as the criterion, we do not imply that they are the most valid measure of creativity. The reasons for this choice are mainly empirical; ratings or grades have been extensively used to measure superior achievement, and they have a real bearing on the academic future of the students. There is no need to point out that, on the basis of the previous analyses, several reservations should be kept in mind when using such variables as criteria.

Table 5.10 presents the variables which showed significant correlations with either the two creativity ratings or the Art Grades, for either the male or the female groups of the sample. The original matrix from which these values were extracted contained 42 variables. Of these 42, only the 14 variables listed in the Table had any significant correlation with Artistic Performance.

The outstanding observation emerging from Table 5.10 is that for male students the personality traits of the 16 PF tend to show a number of significant correlations with the criteria, while none of the same variables correlate for female students. On the other hand, two of the perceptual tests yield five significant correlations for female students, but none for males. Low Economic value is the only variable which correlates with all three criterion measures for males; the error score of the Perceptual Memory Test is the only variable that correlates with all three criterion measures for female students.

Thus male students who are rated as creative, and/or receive better art grades, tend to be characterized by low Economic and high Aesthetic values; by liking to work alone (cyclothymia), emotionality (low ego-strength), introspection (low surgency), shyness (low parmia), sensitivity (premsia), imaginativeness (autia), self-sufficiency, and lack of conformity to social norms (self-sentiment). The female students who are rated creative or who receive better art grades, are distinguished by their abilities at visualizing spatial relationships and by their ability to remember and reproduce perceived visual patterns. They also tend to have higher Theoretical and Aesthetic values. For males, satisfactory performance in the School seems definitely to be related to a constellation of personality traits (five of the seven variables of the "Creative Personality" factor appear in Table 5.10 also). For females, satisfactory performance seems to relate almost exclusively to perceptual aptitudes. It is possible, in other words, that the teachers appraise a male student's originality and potential as an artist on the basis of his personality, with its long-range possibilities rather than on his actual aptitudes; females, on the other hand, are rated on the basis of the perceptual endowment that they actually possess. This may reflect the tacit belief on the teachers' part that male artists will develop their aptitudes with time, while females who don't possess such aptitudes will abandon their career and settle for a domestic life. Or, a different explanation can be offered to account for the same phenomenon: it is possible that for male students (whose perceptual attitudes, at least on the Spatial Visualization test, are significantly higher than those of females), additional perceptual ability does not imply additional creativity. For females, however, whose perceptual level is in general lower than that of the males, perceptual ability is a prerequisite if they are to compete with males in artistic production.

The comparison of the correlation patterns between the Artistic

TABLE 5.10

VARIABLES CORRELATING SIGNIFICANTLY WITH THE THREE CRITERION MEASURES OF CREATIVITY (ARTISTIC PERFORMANCE)

Variables	Males (N=86)			Females (N=93)		
	OAP-1	OAP-2	Art Grades	OAP-1	OAP-2	Art Grades
Academic Grades	.08	.05	.35**	.17	.13	.53***
Spatial Visualization . . .	-.04	.10	-.20	.06	.22*	.27**
Perceptual Memory (Error) .	-.09	-.07	.03	-.25*	-.36**	-.33**
Theoretical Value	.27*	.05	.35**	.18	.25*	-.08
Aesthetic Value	.09	.26*	.20	.08	.14	.20*
Economic Value	-.32**	-.23*	-.40***	-.03	.02	-.04
Cyclothymia	-.23*	-.02	-.29**	-.11	.01	-.18
Ego-strength	-.33**	-.15	-.24*	.02	.10	.07
Surgency	-.28*	-.19	-.26*	-.01	.00	-.14
Parmia	-.34**	-.19	-.15	-.11	.01	-.09
Premsia	.18	.33**	.25*	-.08	.08	-.02
Autia	.03	.26*	.05	-.05	.09	.05
Self-Sufficiency	.28*	.18	.15	.06	-.02	.05
Self-Sentiment	-.27*	-.13	-.07	.14	-.06	.09

*p = .05 **p = .01 ***p = .001

Performance criterion and the other variables when the sample is further divided into fields of specialization does not add appreciably to the understanding of the problem. One aspect of the differences by major is, however, too important to be passed over. As Table 5.01C indicates, the two creativity ratings, OAP-1 and OAP-2, are more highly correlated for Fine Arts students than for Applied Arts students for both sex groups. The OAP-1 rating was given at the end of the first year in school, after all the students, whatever their major, took the same 12 basic art courses. By the end of the second year, however, when the OAP-2 rating was given, the Applied Arts students had been taking specialized courses in Industrial Arts and Advertising, while the Fine Arts students had proceeded in the basic Fine Arts program. The lack of significant correlations between the two creativity ratings for Applied Artists probably reflects the fact that the teachers in the specialized applied courses have a standard of creativity which is less congruent with that of the basic art teachers. Two examples from the correlation matrix may serve to illustrate this difference further.

For male Applied Artists, the correlation of rating OAP-1 (given by the basic art instructors) with Theoretical values is +.21, the correlation of rating OAP-2 (given mainly by applied art instructors) with Theoretical value is -.34. This difference, significant at the .01 level, indicates that for the basic fine arts instructors, students with a theoretical orientation were considered creative, but that the same orientation was considered a hindrance to being creative by the applied arts instructors. Similarly, for the same students cyclothymia correlated -.28 with OAP-1 and +.37 with OAP-2, a difference again significant beyond the .01 level. Thus, while the fine arts instructors seemed to feel that a warm and sociable student would tend to be less creative, the applied arts instructors felt that warm and sociable students tended to be more creative. Or, it is possible that sociable students tend to perform less creatively on the more abstract level required in the Fine Arts, while they behave more creatively when confronted by the more structured tasks in the applied fields.

7. Summary and Discussion

The data reported in this chapter concerning the relationship between different aspects of creativity in a group of artists permit several theoretical conclusions. The major issue seems to be that the various conceptions of creativity currently used do not appear to define a unitary process. Some personality traits or cognitive processes which may be necessary for creative achievement in one specific field, seem not only to be irrelevant in another field, but could even be a disadvantage. Future research in this area should perhaps concentrate on finding a general dimension of creativeness and specific factors necessary in the particular field where the creative process is to unfold.

In a broader sense, these substantive findings raise an issue that is fundamental to the systematic study of creative thinking and creative achievement. The decision anyone working in this area faces is whether to use process criteria or achievement criteria to define creativity. If, on the one hand, such processes as originality and flexibility of mental functioning are assumed to be the relevant general substrata of creative performance no matter what the field of specific achievement happens to be, then the focus of study becomes the construction of more adequate instruments to measure these processes, and one may presume that with more time and ingenuity these will be forthcoming. The advantage of this kind of criterion is that it would be equally relevant to all areas of creativity. The disadvantage is that what seems to be measured by these instruments, although of interest in its own right, has not been shown to have a necessary role in producing works of outstanding achievement. If, on the other hand, the criterion chosen is some form of the actual achievement itself, our confidence that we are dealing with creative production may be increased, but other difficulties arise. The process of creative thinking and performance cannot then be studied aside from the specific field in which the particular achievement selected as the criterion manifests itself. The characteristics seen as the process are predetermined by the nature of the specific creative product. From this point of view, it is highly questionable whether the general aspect of the process or the specific requirement of the context of the product is more significant for creative behavior in the fields, say, of art, mathematics, or diplomacy, or whether the underlying general process--if there be such--functions in the same way in the several fields. In the present study, it may be recalled some very different relationships were found even for such apparently closely related areas as fine arts and applied arts, and indeed for males and females within each area.

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CHAPTER VI

RESULTS IV: "HIGH" AND "LOW" ACHIEVING ART STUDENTS

1. Introduction

Although certain regularities in the relationships among various criteria of creativity are observed for particular groups and subgroups, for the most part the existing measures do not seem to be related with any significant consistency for all groups. In the present study, even within the single group of art students, the measures appear to vary according to the sex and professional goal of the subjects.

In an attempt to obtain a closer view of what may be involved in the process of creative thinking, and more specifically in the creative thinking of art students, we decided to narrow the focus of inquiry by selecting a sample of students of the same sex and the same career goals, and to study them in relation to a single criterion of creativity --even if a very tentative one. Although the generalizations that can be made from such an analysis will be limited in scope, the findings may perhaps clarify our understanding of creativity, and hopefully provide leads for further explorations of a more general nature.

The issue in this final phase of the study then became: which of the sub-groups of specialization should be studied? It seemed to us that there was one field that was especially suited for such intensive analysis. The Fine Arts students more than any other single group may be presumed to be prototypic of the artist par excellence--the group for whom creativity is the most pressing issue. It is they who represent at least potentially the artist-to-be more than the Art Education or the Advertising or the Industrial Arts students. This rather commonsense reason was supported empirically by the findings already presented, which show that it is these students who possess to the highest degree those characteristics differentiating art students as a whole from all other students, and who are closer to such measures as we have of individuals who are already recognized artists or in some way otherwise outstandingly creative.

With respect to the further narrowing of our sample by sex, since there were not enough resources for studying both females and males, it seemed to us that there was good reason for choosing the male Fine Arts students. At least historically, it is the male artist who has made the greatest contribution to art. Although there are many explanations for this--explanations that are interesting but not of immediate concern to the present effort--the historical superiority of males in this respect is undisputed. Accordingly, the choice of subjects for this intensive study fell upon the male Fine Arts students as potentially more fruitful than any other single group.

If the choice of sub-group for this phase of our work was reasonably clear-cut, or at least defensible within the resources currently at our disposal, the choice of the criterion of creativity to be applied was less self-evident. We have seen that on the basis of factorial and correlational analyses, it is impossible to obtain a single all-encompassing measure. Thus the choice of the independent criterion of creativity was necessarily to be made largely, although not solely, on functional grounds. The criterion we sought had to represent both a reasonable measure of some form of creativity and to be of objective significance in the life of the subjects. By these standards, the art grades received by the students seemed to be the most fruitful single criterion. In order to obtain consistently good grades in the art courses, a student had to be at least in some degree creative, and of all the available measures, this one probably had the greatest impact on the present status and perhaps future career line of the student. Accordingly, our sample for study became the male Fine Arts students, and we applied the criterion superior versus inferior art grades to distinguish within the group the more creative and less creative individuals. We then put the research question: Do individuals distinguished by this criterion differ in any significant respects in cognition, perception, values, personality, and observable working strategies?

2. Description of Male Fine Arts Students With "High" and "Low" Art Grades

For purposes of this intensive exploration, the ten students with the highest and the ten students with the lowest art grades were selected from the total sample of 35 male Fine Arts students. Table 6.01 presents the mean art grades, the teacher ratings in originality and artistic potential, and the academic grades of the two groups.

The ten "high" students have average art grades of B or above, the ten "low" students average grades of C+ or below. The High's were rated by their artist-teachers as more "original," and as having higher "artistic potential," the differences between the means for the two groups being .64 S.D. on OAP-1 and .57 S.D. on OAP-2 in terms of the distribution of ratings for all male students. The High's also tended to have better academic grades than the Low's.

There are a number of suggestive differences between the two groups in personal and educational experience, time at which they report beginning to do art work, and in family background. Although the two groups are of approximately the same age (the High's are .8 years older), eight of the "high" students had attended college before entering the Art School, none of the "low" students had any prior college experience (a difference significant at the .003 level by "Fisher's exact" test). A reading of the personal history forms suggests that the High's seem to

TABLE 6.01

RATINGS AND ACADEMIC GRADES OF 20 MALE FINE ARTS STUDENTS SELECTED ON THE BASIS OF THEIR ART GRADES

High Grades					Low Grades				
Code #	Average Art Grade	Average OAP-1 Rating	Average OAP-2 Rating	Average Academic Grade	Code #	Average Art Grade	Average OAP-1 Rating	Average OAP-2 Rating	Average Academic Grade
013	9.2(B)	51*	62*	4.5(C-)	110	5.4(C-)	54*	54*	6.6(C+)
023	8.6(B)	58	58	6.1(C)	092	6.1(C)	37	54	7.5(B-)
033	11.1(A-)	68	71	9.0(B)	125	6.5(C+)	34	57	3.0(D)
076	10.2(B+)	56	58	7.5(B-)	097	5.4(C-)	51	51	7.2(C+)
119	10.3(B+)	48	43	6.0(C)	004	6.6(C+)	58	21	6.0(C)
104	8.9(B)	58	58	3.0(D)	053	6.2(C)	49	54	5.5(C)
037	9.7(B+)	58	56	7.8(B-)	035	6.2(C)	51	53	8.0(B-)
090	8.7(B)	65	57	3.0(D)	021	6.2(C)	39	38	4.2(D+)
026	8.9(B)	51	50	6.0(C)	109	6.7(C+)	55	62	1.5(D-)
116	8.5(B)	43	54	7.8(B-)	101	6.8(C+)	64	66	1.0(F+)
Mean	9.41	55.6	56.7	6.07	Mean	6.21	49.2	51.0	5.05

*Standardized scores for all male art students, mean = 50, S.D. = 10.

have rather more diversified experiences than the Low's. Four of the "high" students were either foreign born or first generation American, one of the "low" students was (p = .10). With respect to the age at which they began being seriously interested in art work, five of the High's report that it was after leaving high school, only one of the Low's reports that it was that late (p = .06). Perhaps contrary to popular belief, the High's report rather more stable family situations than do the Low's: five of the latter report that their parents are either separated, divorced, or widowed, all of the former report that their parents are living together (p = .01). The fathers of the "high" students were of higher occupational status: five of them occupied position of junior executive or better, only one of the Low's occupied such position (p = .06). In general, the successful art students are relatively more mature, have wider experiential background, and come from more stable and somewhat higher social class families than do the less successful students. It would seem to us that the early life and family background of art students is a necessary and promising area for further investigation.

3. Differences in Cognitive Performance

As the data in Table 6.02 indicate, the "high" and "low" subjects differ very little in performance on the cognitive measures of this study with perhaps one notable exception. Although in general the High's performed less well than the Low's on the cognitive tests, on the Object Question Test the mean of the "high" group was almost a full standard deviation above that of the "low" group. Given the small S.D.'s within the two groups--8.0 and 6.7 respectively--the p value of this difference is larger than .01 by a "t" test. This difference is not only interesting in its own right but suggestive for further work in the cognitive differentiation among art students. The Object Question Test is the test that is least structured of the ten measures, and the one that provides the subject with the greatest opportunity for free responses. It requires of an individual the ability and inclination to ask novel questions about common objects, and in the factor analysis, it loaded highest on the same factor as Guilford's "divergent thinking" tests. It would seem that the ability to ask novel questions about common objects, that is the ability to see unusual possibilities and relationships in what is usually taken for granted, is one of the measurable attributes of the creative individual.

To illustrate the differences between the kinds of responses given by the High's and the Low's to the Object Question Test, here are a number of excerpts from the protocols of subjects #037 (High) and #021 (Low). To the stimulus word sea shell, for example, #037 asks the following question: "Is it the sea really inside a sea shell, or is it really a sea shell that is the sea?" To the same stimulus, #021 asks: "In what kind of shells does one hear the sound of the ocean?" Or for the stimulus grass, #037 asks: "Why does grass grow up and not down, and tickle your feet and bend?"; #021: "How much of the earth is covered with grass?" In both examples, #037

TABLE 6.02

AVERAGE STANDARD SCORES OF TEN HIGH AND TEN LOW ACHIEVING MALE FINE ARTS STUDENTS ON TEN COGNITIVE TESTS

Tests	10 High Achieving Students	10 Low Achieving Students	Difference in Favor of the "High" Group
Divergent			
Unusual Uses	48.1*	53.0*	-4.9
Brick Fluency	52.3	51.1	1.2
Brick Flexibility	50.5	55.1	-4.6
Ideational Fluency	50.7	50.3	.4
Object Question	55.3	46.1	9.2
General Intelligence			
Word Association--Flexibility.	46.3	48.3	-5.5
Wonderlic I.Q.	48.4	48.3	.1
16 PF I.Q.	49.5	51.0	-1.5
Spatial Visualization	46.4	49.7	-3.3
Hidden Shapes	48.8	51.2	-2.4

*Standardized scores for all male art students, Mean = 50, S.D. = 10.

asks divergent questions--questions which could not be answered by recourse to a factual statement. In contrast, the questions of subject #021 are pedantic, down to earth; they could be answered by consulting the appropriate authorities.

The other sizeable difference between the two groups occurs in the Production of Novelty score derived from the TAT response. Although this variable did not load on any of the cognitive or personality factors, the ability to write unusual stories to the TAT may be considered a cognitive function. The average standard score of the "high" group on this variable was 55.0, that of the "low" group was 48.1, a difference of .69 standard deviations. A typical response of a "low" student is given by #004 to the slide showing a man carrying an attache case:

> 1) "An unimpressive person is presented in an unimpressive manner doing nothing very exciting. 2) One may have wanted to present such an atmosphere and chose this situation to do so. 3) It is just a man walking down the street with an attache case in his hand. 4) Nothing of much significance will happen."

A representative response of a "high" student is given by #026:

1) "The man drawn is walking to work. Will he make it on time? The drawing is pretty poor. What will his boss say? 2) He overslept because it was too cold to get up. 3) He wishes he could be a real man instead of just a drawing, but as long as he is a drawing he realizes he is safe. 4) He will be late because he is such a poor drawing.

The two responses seem to reflect a similar reaction on the part of the two students: both are unimpressed--as artists should be--with the aesthetic quality of the stimulus picture. But the style of the two responses is very different: the second story is more playful and imaginative than the first. It may be noted that a similar richness and whimsical treatment of TAT responses was noted in creative children studied by Getzels and Jackson (1962).

None of the other cognitive or perceptual instruments showed any sizeable difference between the two groups. It should be emphasized again, that the two tests where large differences were found, are tests where the creative person could give free rein to "richness" in cognitive style.

4. Differences in Values

We have already seen that the male Fine Arts students as a whole have very extreme values (Chapter IV). Their mean score on Economic and Social values are more than one S.D. below the means of male college students, and their mean Aesthetic value is more than two S.D. above college norms. With such extreme means for the total Fine Arts group, there seemed to be little likelihood of obtaining large differences between the "high" and "low" students within the group. Yet, as is shown in Table 6.03, precisely the same three values (Economic, Social, and Aesthetic) that differentiate the total art sample from the norms and the Fine Artists from the other Art majors, also differentiate between the "high" and "low" male Fine Arts students. For each of the three values in question, the difference between the means of the two groups is of the order of one standard deviation.

Figure 6.01 presents a comparison of the raw scores obtained by the two groups on the Values tests with the norms for male college students. It is apparent that on Aesthetic value both "high" and "low" groups are clearly above the norms (the mean of the "high" group is three standard deviations above that of male college norms); on the other values, the means for the "low" group tend to be closer to normative means than to those of the "high" group. Again, evaluative attitudes are shown to be an important dimension on which the "high" (and presumably more creative) art students differ from the "low" (and presumably less creative) art students.

TABLE 6.03

AVERAGE STANDARD SCORES ON TEN HIGH AND TEN LOW ACHIEVING MALE FINE ARTS STUDENTS ON SIX VALUES

Values	10 High Graded Students	10 Low Graded Students	Differences in Favor of "High" Group
Theoretical . . .	52.1*	46.4*	5.7
Economic	41.8	54.2	-12.4
Aesthetic	55.5	46.1	9.4
Social	43.0	57.5	-14.5
Political	51.6	46.5	5.1
Religious	53.1	48.6	4.5

*Standardized scores for all male art students, mean = 50, S.D. = 10.

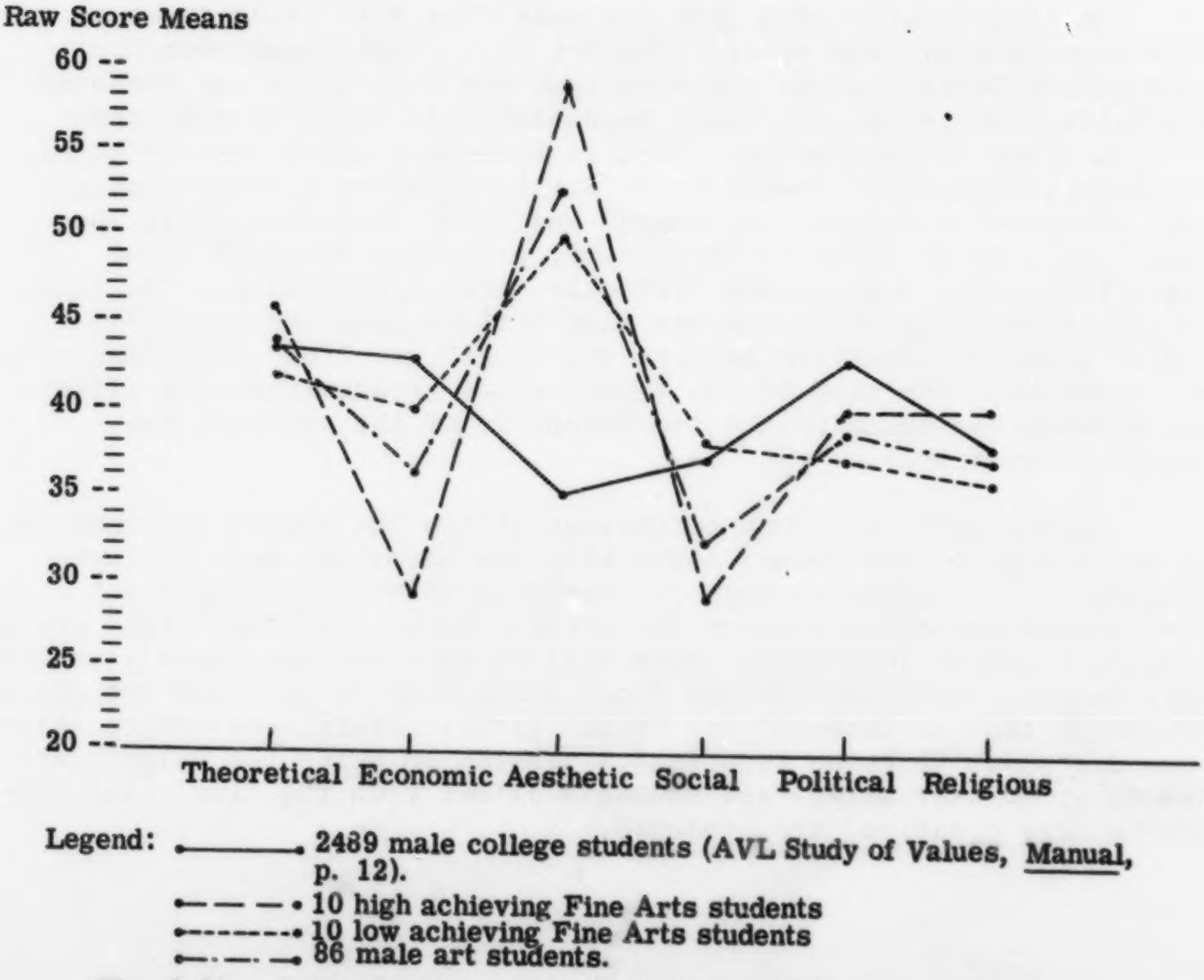


Fig. 6.01 -- Value Profiles of Art Students and Male College Norms

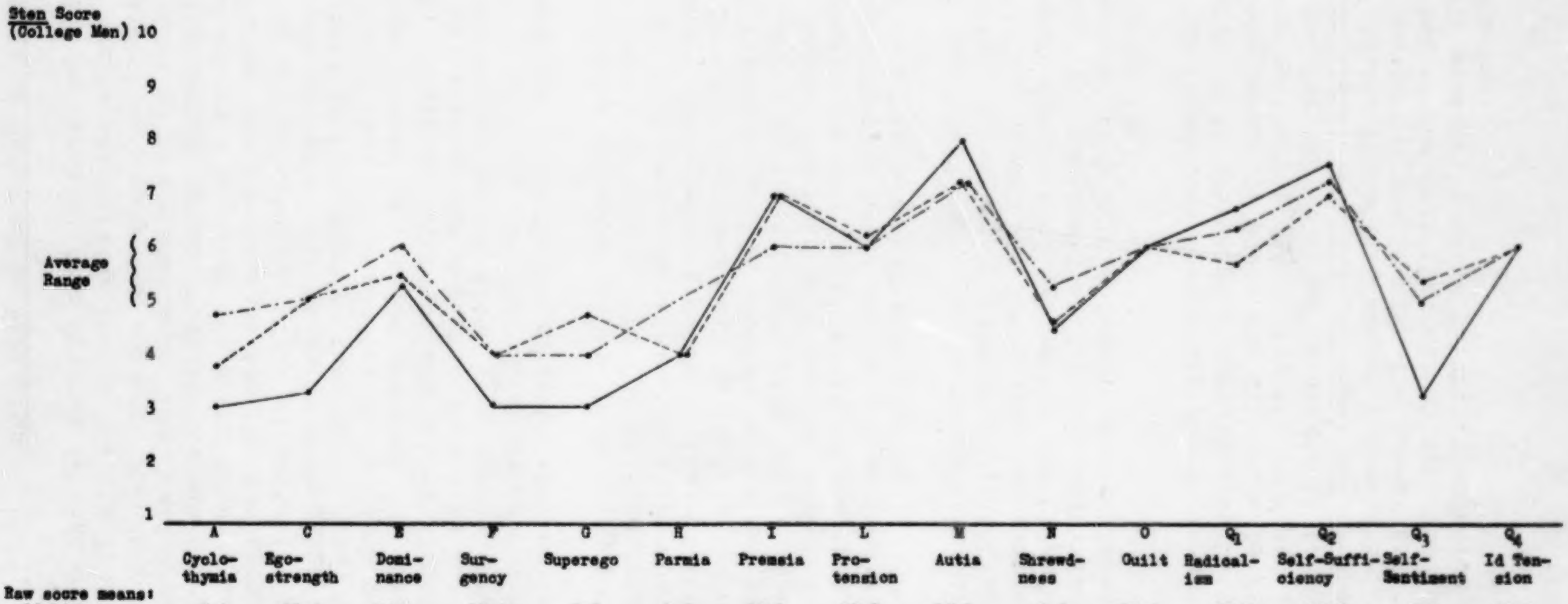
5. Differences in Personality Variables

It will be recalled from Chapter IV that on a number of the personality traits measured by the 16 PF, the Fine Arts students had extremely high or extremely low scores. When the male Fine Arts group is divided by art grades into "high" and "low" students, some noteworthy differences appear between the two sub-groups, notwithstanding the extremes at which the group as a whole operates. Figure 6.02 presents the raw score means for the two groups, as well as the profile of the groups drawn in terms of Cattell's sten scores. Average performance on each trait falls between stens five and six. It can be seen that on five factors the "high" group has a mean sten score as low as three, corresponding to the 11th percentile for the normative data. These low scores occur on the variables cyclothymia, ego-strength, surgency, superego, and self-sentiment. Sten scores of eight (89th percentile) are achieved on autia, and 7.6 on self-sufficiency. A difference of about two sten scores between the "high" and "low" groups is obtained on the variables ego-strength, self-sentiment, and superego, with the "high" group scoring lower on these traits.

It should be emphasized that there is no profile containing as many extreme scores as that of the "high" Fine Arts students among the 28 occupational profiles reported in the 16 Personality Factors Test Manual. Perhaps the closest profile to that of the "high" group is the one of 300 eminent researchers in physics, psychology, and biology (Cattell and Drevdahl, 1955). Common to the two profiles are the extremely low scores on cyclothymia, surgency, superego and the high scores on premsia. The main differences between the leading scientific researchers and the "high" students are that the latter have much less ego-strength, lower parmia and self-sentiment, while they score higher on autia and self-sufficiency.

Thus, the "high" group can be characterized as extremely aloof, reserved (Factor A); serious, taciturn (F); lacking in rigid internal standards (G); and sensitive (I)--these characteristics being also true of eminent researchers. Moreover, the "high" artists are also very emotional (C), imaginative (M), self-sufficient (Q_2) and have low self-sentiment, or very little concern for conforming to socially accepted behavior (Q_3).

When the "Composite Creativity Score" is obtained from the 16 PF means according to the weights suggested by Cattell (IPAT Bulletin #10, 1963), the composite score for all the male Fine Artists is 101 (corresponding to the 9th sten), for the 10 "low" students it is 97.4 (8th sten), and for the 10 "high" students it is 103.6 (corresponding to sten 10) or higher than that of about 99% of the normal male college population. Again, if the difference between the 10 students with the highest art grades and the 10 with the lowest art grades is not greater, this may be due to the fact that all 35 male Fine Arts students had a mean composite creativity score which was superior to 96 per cent of the male college norms.



Raw score means:	A	C	E	F	G	H	I	L	M	N	O	Q_1	Q_2	Q_3	Q_4
10 high	5.3	11.4	13.3	10.4	8.8	9.3	12.1	10.8	16.0	9.6	11.4	10.7	13.6	7.2	14.5
10 low	6.7	14.3	13.4	12.3	11.8	9.5	11.7	11.3	15.4	9.7	11.9	9.7	13.0	10.3	14.8

Legend: •——• 10 high achieving Fine Arts students; •– – –• 10 low achieving Fine Arts students; •–·–·–• 86 male art students

Fig. 6.02.—Personality Profile and Mean Scores of Art Students on the 16 Personality Factor Test

6. Intensive Study of Selected Subjects: Comparison of the Working Strategies of "High" and "Low" Students

In order to illustrate the differences between students who belong to the "high" and "low" groups in more concrete terms, one subject from each group was selected for more intensive analysis. Part of the analysis will concern data collected individually from the students through an experimental drawing session and interview to be described below.

a. Comparison of Test Scores

As a representative of the "high" group we chose subject #033. Of all the male Fine Arts students he had the highest grade-point average in art courses (11.1, or about A-) and he was rated by the teachers as the most creative (OAP-1, standard score = 68; OAP-2 = 71, or about two S.D. above the average male art student). For the low group, subject #021 was chosen; he had one of the lowest grade-point averages in art course, and had the lowest Originality and Artistic Potential ratings. These two students represent extremes in the range of achievement among the male Fine Arts students at the school. It should be added that while #033 has never received any financial remuneration for his art-work (scholarships excepted), #021 is regularly employed as an illustrator for a commercial concern.

In terms of intelligence and divergent test scores, the two students hardly differ. On the Wonderlic Intelligence Test, #033 has a standard score of 53, #021 a score of 52. On the 16 PF intelligence factor, #033 scores 59, and #021 has exactly the same score. The students have very similar scores on the divergent tests, except on Brick Flexibility, where #033 has a score of 59, while #021 has a score of 43. On the perceptual tests, the two students again have similar scores, except that #033's performance on the Spatial Visualization Test is average (standard score = 49), while #021 does very well (standard score = 65).

When we turn, however, to the value and personality measures, some very strong differences become apparent. The difference in the values of the two students is presented in Table 6.04. In Theoretical values, the score of #033 is three standard deviations above that of #021; on Economic values, it is three standard deviations below. Student #033 differs somewhat from the average "high" student inasmuch as he has extremely high Religious values, and only average Aesthetic values. However, #033 claims no religious affiliation and does not attend worship, so that, as he makes clear in his interview, this value reflects a personal concern for the transcendental rather than conformity to a set body of church beliefs. The smallest difference between the two students is 1.1 S.D. in Aesthetic values; the largest is 3.1 S.D. in Theoretical values. It should be noted that a standard score of 39 in Aesthetic values corresponds to a raw score of 45, which is still about one S.D. above college norms.

TABLE 6.04

STANDARD SCORES OF TWO SELECTED FINE ARTS STUDENTS ON THE ALLPORT-VERNON VALUE SCALE. MEAN FOR ALL MALE ART STUDENTS = 50, S.D. = 10

Subject	Theoretical	Economic	Aesthetic	Social	Political	Religious
#033	62	24	50	34	47	75
#021	31	53	39	59	61	55

When the personality profiles of the two students are compared, a number of notable differences appear (Figure 6.03). On the basis of his 16 PF scores, student #033 is an extremely introspective person (Factor F), quite intelligent (B), extremely sensitive (I) and self-sufficient (Q_2), very "experimenting and free-thinking" in temperament (Q_1), imaginative (M), "insightful and aesthetically fastidious" (N), and "low in Id tension" (Q_4). If on several factors he possesses the utmost degree the characteristics of the "high" group (Factors F, G, H, I, M, Q_1, Q_2), he is also atypical on some traits: his scores on Factors A and C are average instead of being low, and on Factor N he has a high score rather than an average one.

The profile of student #021 is much less extreme. The only factor on which he has a more "creative" score than #033 is on Factor N; here #021 scores five stens lower than #033. But he is also five stens lower in radicalism and self-sufficency. Altogether, when Cattell's composite creativity score is computed for the two subjects, the total creativity score of #033 is 117 (sten 10) and of #021 it is 95 (sten 8). This would be equivalent to the 99th and 89th percentile values respectively according to Cattell's norms, but it must be recalled that the group as a whole from which the two subjects were drawn is at the 96th percentile by these norms.

B. Comparison of Working Strategies

The following section consists of a comparison of the two selected students' behavior in an experimental situation where they were asked to produce a drawing. The experiment was designed so as to simulate as closely as possible the environmental conditions in which artists work, with the purpose of observing the behavior of art students while they were involved in "creative" production. It is of course clear that no experimental situation ever completely replicates the real thing. Nonetheless, the subjects stated their working processes here and at home were not dissimilar.

A studio at the School was made available for the experiment. A variety of objects was displayed on a table, ranging in

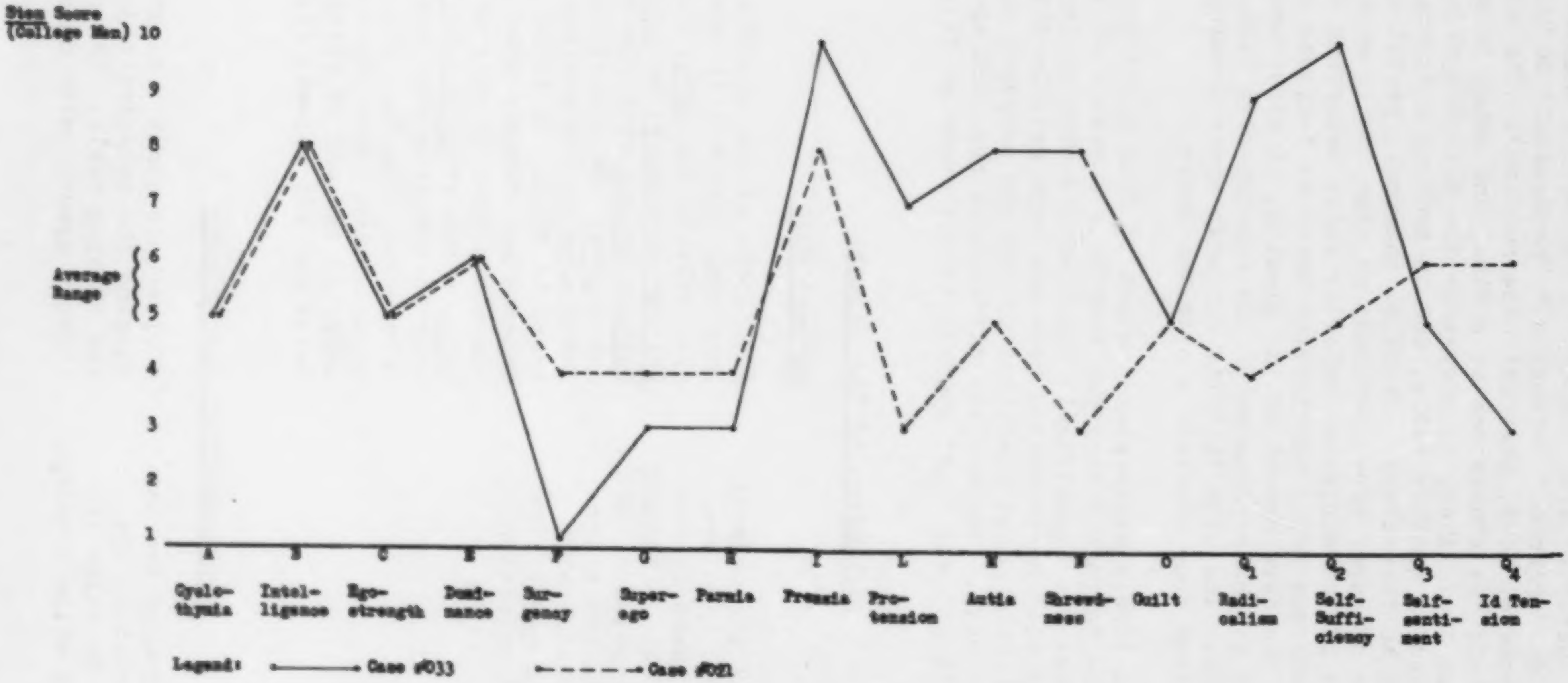


Fig. 6.03.—Comparison of Profiles of Two Selected Fine Arts Students on the 16 PF Test
Sten Scores for Normal College Population

representational character from "human" (a mannequin, Chinese doll, statuette), through "organic," "utensils," "mechanical" to "abstract" objects (prism, sphere, lens, abstract construction). The subjects were introduced into the studio one at a time, and asked to select as many objects as they liked, to rearrange the selected objects in any way they wished on another table, and to produce a drawing that would be pleasing to themselves. Pencils, charcoal, pastel colors, and two varieties of paper were provided; no time limits were set. A detailed record of the subjects' behavior while selecting and arranging the objects was kept; photographs taken at 3-minute intervals illustrated the development of the drawing. A structured interview, obtained at the conclusion of the experimental task, completes the records. The time that the subjects spent drawing ranged anywhere from four minutes to over two hours.

Given the purely exploratory nature of this pilot study--a study that we hope to pursue at great length as a result of this development project--no quantifiable measurements were collected at this stage. What will be presented here are some notable differences in the working strategies and behaviors of the two subjects selected for intensive analysis. Whether the differences observed are characteristic of the "high" and "low" groups, is not known at this point.

Selection of the Objects

Subject #033

#033 looks at all the objects for less than 30", then selects the horn; takes it over to the drawing table. Turning back towards the objects, he immediately takes the sphere and puts it on the drawing table next to the horn. The whole process of selection lasts about 45".

Subject #021

#021 looks at the objects for a long time (about 2'); then he also selects the horn, later a Chinese statuette, an antique book, a branch with elm leaves, and a pipe. He places these objects next to one another and inspects them. He tries other objects and matches them with the above ones (a pair of castanets, a cut of silk fabric, etc.), only to put them back among the unselected objects. The process of selection lasts about 4 minutes; at the end of which he retains the six objects listed above.

Arrangement of the Objects

#033 does not arrange the two objects he selected on the drawing table. He holds the horn in his hand while drawing,

#021 spends about 5 minutes arranging the selected objects on the drawing table. He moves the objects around until he achieves and draws this object from two different perspectives. After finishing with the horn, he picks up the sphere and draws it also holding the object in his left hand. The composition occurs on the paper, rather than as an arrangement of objects on the drawing table.

a suitable "still life" composition, which he then proceeds to reproduce on the paper.

Reasons for Selecting Objects

Asked why he chose the horn and the sphere, #033 answers that the horn possesses certain visual qualities which he is intrigued by. He claims that as soon as he saw the objects, the shape of the horn immediately "hit" him; he did not think of it as a horn, but as a combination of complex intertwining lines with a beautiful rhythm. Immediately he visualized a finished drawing consisting of the horn presented in two different perspectives (see Ill. 6.01). The complex lines of the drawing were to compose an intricate symmetrical form with an internal rhythm, yet conveying an over-all impression of static repose. After selecting the horn for this purpose, he claims to have looked around for an object which would fit into the projected design, and would also serve to bring together the two halves of it; the sphere seemed to serve this purpose and therefore was included in the design.

Asked why he chose the objects in his drawing, #021 answers that all the objects fit together because they were old, had a patina of antiquity. The horn was battered, looked like "someone who had seen long and honorable service." The Chinese statuette was also old, and had a likeable smile on its face. The leather-bound book was also old, and signified learning. The pipe had been included for it connoted sophistication. The branch helped to bring together the other objects visually (see Ill. 6.02). The over-all effect of the drawing is supposed to convey a happy, sophisticated atmosphere of leisurely pursuit of learning and other durable pleasures.

From these illustrative contrasts we can perceive a number of critical differences in the general approach of the two students to their work. The principle that #021 used to bring the objects together in his drawing is that of "antiquity." The composition fits together in the first place because the objects are all antique. His drawing could be seen as an illustration of a quality already present in the objects. On the other hand, #033 uses the qualities of the object to produce a form which transcends the object itself--the draw-

Illustration 6.01

Illustration 6.02

ing with the horn reproduced twice is more than the sum of its parts. If one views the drawing task as a problem-solving situation, it may be said that #021 has stated his problem in terms of a principle which was present as an immediately recognized attribute of the objects themselves, that is, their antiquity. The solution to the problem consisted in selecting and matching the objects according to this common quality, in order to present the viewer with an illustration of the quality or attribute. Subject #033 stated the problem in terms of a principle which was only suggested by the object, but existed completely only in his imagination. It consisted in two complex, rhythmically moving forms which would convey a total effect of stasis. In this sense, #033 could be said to have "discovered" a problem which did not exist as such in the experimental situation, while #021 formulated his problem in terms of a principle already present.

A similar difference holds for the use the two students make of the objects they select. Student #033 does not think of the horn as a horn, but as an object characterized by certain visual qualities which can be used in the solution of the problem he has envisioned. Student #021, on the other hand, uses his objects in terms of their commonplace connotations: book = learning, pipe = sophistication. While #033 is free to see the horn and the sphere without being bound by their accepted function and meaning, #021 accepts his objects at face value and uses them within a usual frame of reference.

Similarly in the arrangement of the objects one can observe the greater freedom of student #033. As the problem he has discovered exists only in his imagination, it cannot be "copied" from reality; the composition of the drawing had no counterpart in the "still-life" arrangement. The problem that #021 has set up to solve was formulated as a function of the obvious relationships between the objects, and all he had to do was to copy faithfully the objects themselves in their still-life arrangement.

This brief comparison may suggest some fundamental differences between the thought process of creative and less creative artists. These differences can be summarized as follows:

a) The drawing, viewed as a problem-solving process, starts when the artist begins to have an idea of what its subject-matter will be--that is, when he "states the problem." In order for the drawing to be creative, either a new problem has to be discovered, or an old problem envisioned in a new way.

b) The above implies that the idea for a drawing in a creative person can arise only in part from relationships observed in the environment. While the environment supplies clues for the "problem" or "subject-matter" of the drawing, the creative person re-interprets the environmental clues in a novel form before a creative solution, or drawing, can result.

c) In order to be able to do this, the creative person has to be, to a certain extent, "blind" to the usual function, form, or connotation of the objects or relationships observed in the environment; or, to put it positively, he has to be "open" to the possible and the unusual. He has to be able to see the objects in new ways by emphasizing some of their aspects, by combining them in unusual ways, or by "distorting" them, that is, "distorting" the conventional "meaning" although not necessarily the recognizable "appearance."

d) The finished drawing is the resolution of the problem envisioned by the artist. It is a solution in that it combines visual stimuli observed in the environment with an idea or feeling experienced by the artist, and presents this combination so that the experience can be replicated by the viewer. If the problem and its solution are creative, the finished drawing will evoke a new kind of experience in the viewer, just as the creative formulation and solution of a mathematical problem opens up new avenues for thought. To return to our examples, the drawing produced by #021, although competent and pleasing, does not suggest any new way of seeing, thinking, or feeling about reality. In contrast, the drawing of student #033, although perhaps too rigid and symmetrical, may to a certain extent add to the viewer's repertoire of ways in which the environment may be perceived.

As another example of "creative" problem-solving observed in our pilot study, we present the case of student #015. Because of his average art grades, he was not included among the "high" and "low" groups discussed in this chapter. Although his grades and creativity ratings are average, #015 has achieved during the year of our study a number of impressive professional distinctions. He was invited to one of the most important "shows" of the year. More than this, in competition with dozens of established professional artists he won the third prize. In collaboration with other artists, he organized a successful and well-publicized exhibit of young painters. He has a contract with a respected gallery which exhibits his work and has sold several of his pictures during this period. In short, at least by the outward standards of his profession, #015 has achieved to a signal degree the goals for which the School provides training.

In the experimental situation, #015 chose the mannequin, the sphere, prism, and a circular lens. It took him six minutes to select all the objects, and during this time he seemed intrigued by the optical effects of the prism and lens: he often looked at the objects through them. During the drawing process he moved the objects around to see them in different perspectives, twisted the limbs of the mannequin, and kept experimenting with the objects.

When asked about the reasons for his choice of objects, #015 mentions his attraction for circular shapes: the sphere, the joints of the mannequin, the lens (of this latter he also adds: "I like the idea that it changes images, that you can see through it"). He goes on: "The circle is the first symbol in all cultures, it represents the infinite--it's almost an archetype. When you see it, it means the same thing for everyone. . ." (see Ill. 6.03). He adds that while working he was not thinking about symbolic meanings; he was only concerned with the rhythm and pattern of the design. But looking back on the drawing it's the symbolic part that "hits" him; for instance, the mannequin suggests an hour-glass to him. Several times #015 mentions that what he likes to paint, and what this particular drawing also achieves, is the element of impossibility in life: "I like the idea of the impossible situation. What impresses me is that things like that [i.e., the subject-matter of the drawing] don't happen. What I am working for . . . is to put down on canvas things that don't happen."

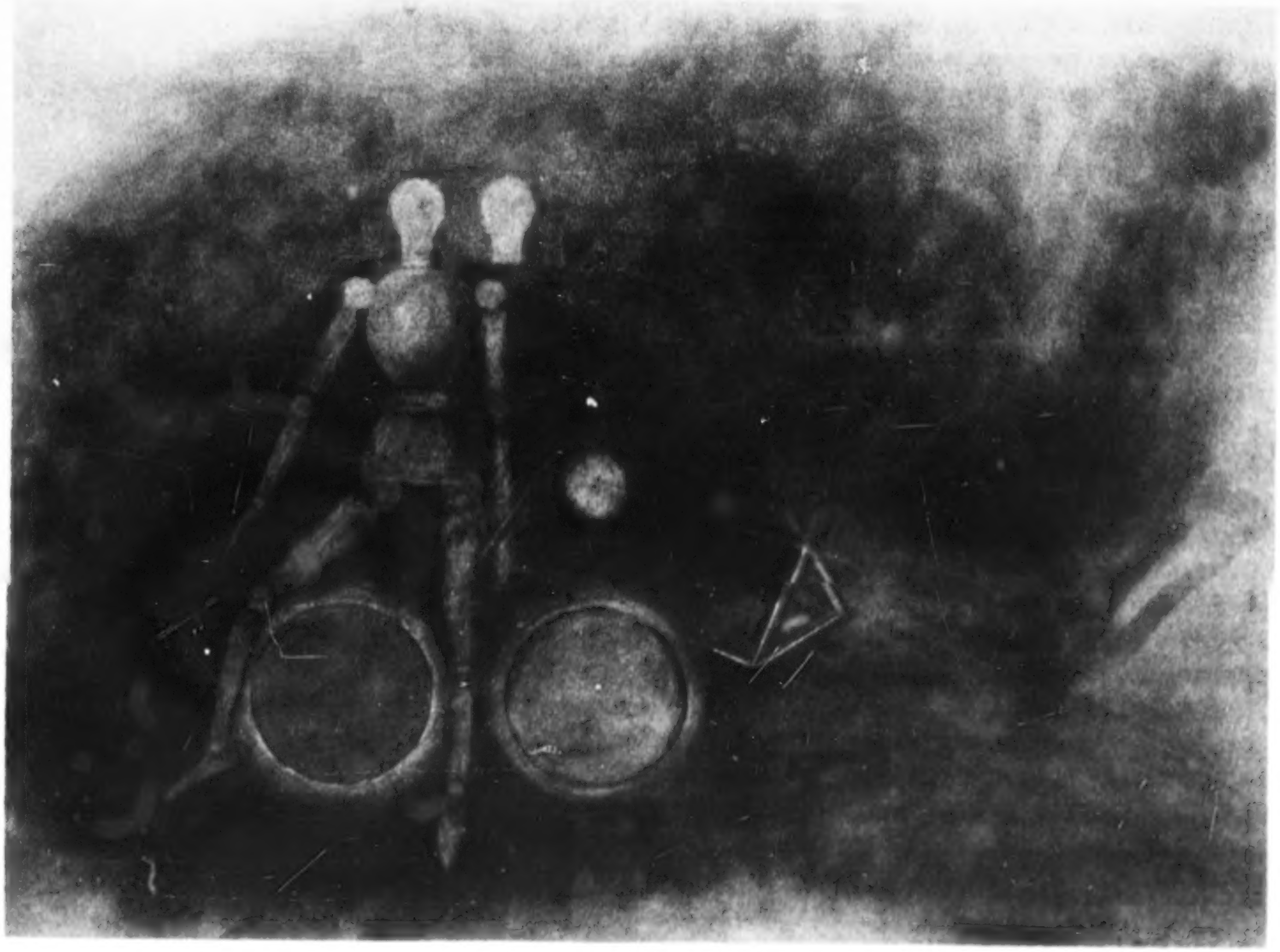


Illustration 6.03

We see in this case some similarities with the process used by #033: disregard for obvious meaning and qualities of objects; no "still-life" arrangement, but free placement of the objects in an imaginary space; the desire for producing something that would mean more than the objects themselves do. But #015 formulates his problem on several levels at once. In the first place, on a formal level, the circular characteristics of three of the four objects become an organizing principle. These circles, however, have also a symbolic meaning of which he is aware; in addition the mannequin, although seen as a composite pattern of circles, also represents a man-hour-glass. Finally all the elements together combine visually in a "subtle rhythm"--to use #015's evaluation--which, on a different level, also represents the impossible situation, the absurdity in life, with which the student is so much intrigued.

Again, we see in #015 some of the richness of the creative problem-solving process. The general problem which interests this student is to state what is impossible in life, perhaps to find through limit-cases the boundaries of possibility. In order to formulate this general problem in the specific situation, he selects and organizes formal, symbolic, and idiosyncratic qualities of elements in his environment. The product, or solution, re-states the visual and symbolic elements of the original problem so that the latter can be--hopefully--conveyed to the viewer. The viewer, in his turn, may then become aware of the problem confronting the artist.

It is along these lines that an analysis of creative cognitive processes may well be most fruitful. First, the specific steps required in the activity considered (in this case, the conception and execution of a drawing) may be translated into a general cognitive schema (in this case, formulation and solution of a problem). Then the behavior of the subjects, while engaging in creative activity are observed and studied within the general cognitive schema. At the present point in research on cognition, this approach promises rewarding insights into the processes of creativity.

5. Summary and Discussion

In this chapter we focused on a group of students who by career choice and test performance are most likely to include creative individuals. These are our male Fine Arts students. Even the lowest achieving subject in this group scores higher on the Cattell creativity index, as an instance, than 89 per cent of the general college population, while the highest achieving subject is well above 99 per cent of the normative population.

In view of the restricted range of performance in the group as a whole, differences between sub-groups divided by high art grades and low art grades are of course difficult to observe. And in fact virtually no differences are found on standard tests of intelligence and divergent thinking. Nonetheless, on two cognitive instruments requiring free responses, the high group did perform substantially better than did the low group. The two instruments in question--the Object-Question Test and the TAT Novelty Score--do not entail issues of specific information and knowledge or analytic and logical powers in the usual sense. In order to obtain a high score in the tasks posed by these instruments, almost the opposite of such functions is required, for to do well the subject must in large measure disregard the usual meanings of the stimuli and re-interpret them in a new and idiosyncratic context.

It was not, however, in the cognitive tests but in the evaluative and personalistic observations that the most significant differences were found. The most successful art students are characterized by extremely low Social and Economic values and by very high Aesthetic values, the latter being unmatched by any group for whom norms are available. With respect to personality variables, despite the already restricted range of scores, for the Fine Arts group as a whole, there are striking differences between the high and the low sub-groups.

Compared to the less successful art students, the more successful art students, like Cattell and Drevdahl's creative individuals (1955), are to an extreme degree reserved, serious, lacking in rigid internal standards, sensitive, free-thinking, and self-sufficient. Moreover, they are low in emotional control and resistant to conventional standards. They are high in imaginativeness. Within this general pattern, there are of course individual variations. For example, the student with the very highest art grades and originality ratings had average scores in emotional control and reserve but the highest possible scores in sensitivity and self-sufficiency and the lowest possible score in surgency. It may very well be that extreme scores on some criterion attributes rather than generally high or low scores on all criterion traits is the critical characteristic of the creative art student.

The pattern of results here seems to suggest again that success in Art School (used here as an index of creativity) does not depend on superior intellectual performance as measured either by the usual intelligence or divergent thinking tests, at least as reflected by the instruments used in this study. The cognitive process at which art students excel is one that seems to depart from the conventional rules of mental operation, tends to question the usual meanings of objects and events, and tries to find new relationships in place of the obvious ones. It is for this reason perhaps that the standard intellectual tests fail to differentiate between the more and the less creative students, and the least structured and most open-ended cognitive measures do succeed in differentiating them. For the force of the unique value and personality disposition of the creative individuals--their stronger aesthetic orientations, higher imaginativeness, lower need to conform--can have opportunity to assert itself on cognitive responses only when the cognitive tasks are "open" rather than "closed."

The observation of individual art students engaged in creative production, and the interview supplementing the observations, may provide deeper insights into these cognitive processes than are now available. For one thing, such observations would permit us to determine the nature of the problematics that stimulate the creative person. What does the artist or the creative person see as the problem when he begins to work? Or perhaps better, how does he see the problem? For another, the observations and interviews would provide us with more precise understanding of how the creative person formulates the problem which he is interested in solving. If, as is presumed, he does not follow the ordinary logic of problem-solving, what "logic" does he follow to structure the problem? It is our feeling that it is precisely at this point--in the nature of the problem--perhaps more than at any other, that the dynamics of creative thought may be revealed. And finally, once the process of discovery and formulation of the problem is clarified, much that is now obscure about the patterns of creative problem-solving will be brought to light. For the solution of a problem is largely a re-statement of the original problematic elements in a new form. How does the artist envision the problem to transform it into a creative solution?

Although the problems raised in artistic creativity are in many respects vastly different from the problems germane to mathematics or the empirical sciences, the steps in the discovery, formulation, and restructuring of issues may have commonalities across the various disciplines. It is in this sense that insight into any creative thought process may shed light on all creative thought processes, and it is as important to recognize possible similarities in the creative process across disciplines as it is to be aware of the possible variations among the disciplines.

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CHAPTER VII

CONCLUSION

The general objectives of this research and development study were: (1) To explore the possible contributions of the arts to education in this aggressively scientific age, (2) to demonstrate the need and possibility of empirical work in the area, and (3) to provide a framework of issues and methods capable of stimulating and guiding further theoretical and experimental inquiry. In this final chapter we essay some summary remarks with respect to each of these issues.

1. The Artist's Function in Contemporary Society

A basic set of questions likely to be asked of an investigation of art students is: Of what use is the study of artists to society? What can we learn from them that is germane to our educational and other problems? Isn't the artist an atypical member of society, and would not generalizations based upon him have little bearing for anyone else?

There is in fact a salient difference between the art student --and more specifically the Fine Arts student--and practically every other kind of student. However, it is precisely this difference that makes him worthy of study not only in his own right but for what he and his work imply for society as a whole. In contrast to almost all other college-level or at least professional-school students, the Fine Arts student is not preparing himself for a job.

To be sure, like other professional-school students, he hopes to acquire a set of definite skills, and like the other students he hopes to be paid for the exercise of his skills. Art students intend to earn a living as artists quite like like banking students intend to earn a living as bankers. But this is not their primary aim. Some of the Fine Arts students may indeed make a living from their art by teaching, and some may find themselves in advertising agencies. But teaching is not viewed by them as a career, or they would have majored in Art Education; and advertising--though often very lucrative--is not viewed by them as a career either, or they would have majored in Advertising Art.

The Fine Arts student sees his real goal in life as producing something of ultimate and permanent value, and uses his particular talents only incidentally for making a living. The crucial difference between the artist and other individuals, and his unique place in our society, is stated cogently by Hannah Arendt (1958, p. 172):

> Whatever we do, we are supposed to do for the sake of "making a living"; such is the verdict of society, and the number of people, especially in the professions who might challenge it, has decreased rapidly. The only exception society is willing to grant is the artist, who, strictly speaking, is the only "worker" left in a laboring society. . . . As a result, all serious activities, irrespective of their fruits, are called labor, and every activity which is not necessary for the life of the individual or for the life process of society is subsumed under playfulness.

There is another crucial difference between the artist and other people that we have lost sight of, and which it may be well to reconsider in the education of our children. The difference revolves about the meaning of useful: who is useful, what is useful. The farmer is self-evidently useful because he provides food, the tailor because he provides cover, the carpenter shelter, the teacher skill, the doctor health, the physicist knowledge, the statesman law --all needed for the maintenance of life and the preservation of society. But what does the artist produce? Frills and decorations, baubles and playthings, objects hidden in mansions or stored in museums--without which surely life and society are not threatened as they would be in the absence of food or shelter or skill or knowledge or law. In this sense, the artist and the artist's product are not "useful," at least not manifestly, and artists have come to be thought of as unproductive, if not parasitic. In this connection, it is perhaps not insignificant that in a recent study of prestige rankings of careers in America, Nuclear Physicist, Scientist, and Government Scientist, which in 1947 held ranks of 18, 7, and 10.5 had in 1963 risen to ranks 3.5, 3.5, and 5.5 respectively, but Musician, Artist, and Novelist, which in 1947 had already held the lower ranks of 24.5, 29, and 31.5, in 1963 declined still further to be tied at rank 34.5, some ten ranks below Dentist, Lawyer, or Chemist (Hodge, Siegel and Rossi, 1964).

That the view of human "usefulness" as the production of the immediate necessaries of life is not the only possible one, and in fact that this view carried to its ultimate implications is debasing of the fundamental values to which we claim to aspire hardly needs argument. The glorification of work for the necessaries of existence --what Arendt calls "labor"--is only of relatively recent origin, beginning perhaps with the industrial revolution when universal labor was equated with affluence and affluence with enlightenment.

In the tradition of Greek and Judeo-Christian thought, on which our so-called "higher aspirations" are founded, work done merely for the necessaries of life was not considered the highest form of human endeavor. Devotion exclusively to this was held inimical to the human spirit. To be sure, engagement in work for the necessities of existence was unavoidable, but he who gave all his life to "making a living" was not truly alive as a human being. For the need to maintain life is common to all forms of living matter. It is only in the activity free of this immediate need--what we have come to call merely play or recreation--that the uniquely human nature of man manifests itself.

"The life of money-making is one undertaken by compulsion," as Aristotle remarks, and the modes of life worthy of man as man are those which are neither "necessary" nor "useful" in the common meaning of these terms: the life of the artist or aesthete, who searches for things of sensory beauty; the life of the citizen involved in public affairs, whose work results in deeds of beauty; the life of the philosopher, who is devoted to the contemplation of ideas of beauty (see also Arendt, 1958, p. 13). The consumption, production, and understanding of objects, ideas, and deeds of beauty are the primary aims of man as man and the ideals of earthly existence. In this sense, artists remain among the few groups today who, by vocation and avocation, follow the life that makes man human.

Still, the question may be raised: In what way is the artist of value to others--socially, educationally? Does the artist's work express only his own humanity or does it contribute to everyone's humanity? The issue may be dealt with at numerous levels. One line of argument--the one we shall advance as an instance here--derives from Heidegger (1962).

Action which has as its only goal the satisfaction of the necessities of life ends with the life of the individual itself. A world in which the only activities are those aimed at self-maintenance is a meaningless and ephemeral world; activities are pursued and objects produced only in order to be used up. When the criterion of production is but usefulness for consumption in the meanest sense, the standard of value we invoke when appreciation and permanence are the goals becomes irrelevant. While the Baths of Caracalla still stand, New York's Pennsylvania Station, built with such ingeniousness after its image, disappears to be replaced by a structure with planned obsolescence. Even the two most human processes, speech and thought, follow the fate of the individual life-cycle if "usefulness" is the sole criterion of behavior. Again, Arendt (1958, p. 95) speaks cogently regarding the artist's unique function in society here:

> . . . action, speech and thought . . . do not produce, bring forth anything, they are as futile as life itself. In order to become worldly things, that is, deeds and facts and events and patterns of thoughts or ideas, they must first be seen, heard and remembered and then transformed, reified as it were, into things--into sayings of poetry, the written page or the printed book, into paintings or sculpture . . . the whole factual world of human affairs depends for its reality and its continued existence, first, upon the presence of others who have seen and heard and will remember, and second, on the transformation of the intangible into the tangibility of things.

The reference--or at least one reference--by which individual and social life acquires transcendental meaning and value is the work of the creative person: work that is not done because it satisfies some immediate necessity of existence but because it is satisfying in itself. This is surely one sense in which the Renaissance artist gave meaning and value not only to his own life and his own time, but to all lives in all times.

The present surge of research interest in creativity has focused only incidentally on artists, and even then with a certain condescension. Compared to the pretigious scientist, engineer, or executive, the artist seems to have been viewed as a dealer in the expendable frills of life. Clearly quite the opposite is the case. To some extent at least, the current study of creativity has itself been influenced adversely by the industrial view of "usefulness." It is perhaps time to review the function of the artist at some greater length than we have been able to do here, and to consider seriously the possible contributions in the education of our children not only of the artist's art but his attitude toward life and toward "usefulness."

2. The Empirical Investigation of Art Students and Creativity

The thesis set forth in the preceding section argues that the artist is a significant subject of study not alone because his work is an example of creative production but because the artist's orientation to what is "useful" in life is unique, valuable, and in many ways exemplary for education. By understanding art students better, we may learn to understand better all those who have the inclination and courage to strike out in uncertain directions, and more especially to understand those who persist in applying themselves to work which is unrelated to the immediate necessities of existence and consequently considered "useless" by the rest of us.

From this point of view, the present empirical observations with respect to the art student's personality are systematic and sensible. The extraordinarily low scores of our subjects in Economic value--and the observed negative correlations between this value and artistic performance--are exactly in keeping with what might be expected of individuals whose career choice is essentially unrelated to "making a living." The high Aesthetic and Theoretical values are also entirely reasonable, and the extreme scores of the Fine Arts students, especially of the more successful ones, add to the portrait of the art student as deeply involved with matters of beauty and meaning, and uninvolved except superficially in economic and social matters.

A consistent finding in our work as well as in the work of others is the low interest in sociability displayed by artists and art students. In our data, they score low in AVL Social values and in 16PF cyclothymia and surgency. The terms most often used to describe individuals with such scores are: cold, aloof, reserved, sober, serious. Again the scores of the more successful Fine Arts students were more extreme than those of the group as a whole. The same pattern was found by Rees and Goldman (1961) who report negative correlations between creativity and friendliness; by Drevdahl (1956); and by Hammer (1960) who describes promising young artists as inclined to shun the pleasantries of social relationships and to retreat into isolation.

That aloofness from social entanglements is a condition for accomplishing something of special value and originality has long been recognized. Aristotle, for example, suggesting, "Therefore friends in excess of those who are sufficient for our own life are superfluous, and hindrances to the noble life. . . ." The disinclination of our subjects for sociability as represented by their performance both on the Study of Values and the 16 Personality Factors seems entirely right for individuals involved in creative endeavor. We cannot resist the temptation to wonder whether the emphasis on groups and togetherness so prevalent in our schools is altogether salutary if education is to include not only learning the "information given" but learning "to go beyond the information given."

The high scores of our subjects in 16PF radicalism, self-sufficiency, and the low scores in superego and self-sentiment are also consistent with the requirements for creative behavior. Dissatisfaction with accepted standards and reliance on oneself must underlie the motivation of an individual who would transform convention by drawing on his own resources. In the study by Hammer (1960) to which we have already referred, self-directedness, independence, criticality, and individuality are found to be the outstanding characteristics of the artist. Burgardt (1961) similarly found that self-sufficiency, social independence, and non-conforming behavior correlated significantly with art experience. MacKinnon (1959) reports that creative architects and writers were characterized by independence of behavior, and in an experimental study, Barron (1953) found that artistically-inclined individuals were more resistant to group pressure.

The high scores obtained by our subjects on the 16PF Factor I, sensitivity, and Factor M, imagination, are not surprising; it would be belaboring the obvious to comment on the necessity of these qualities for creative work. Suffice it to say that Drevdahl (1956) found the same qualities to be concomitants of creative achievement in his sample; Feibleman (1945) argues the case for the unique sensitivity of the artist; and Ghiselin (1959) emphasizes the role of imagination in creative work and suggests, "Imagination . . . is a necessary structuring and restructuring, shaping and reshaping of everything that we know and are."

A number of the sex-related differences in our data point to what has previously been observed clinically and remarked upon theoretically. Male art students tend to exhibit characteristics usually associated with feminine personality structure (e.g., high on 16PF Factor I, low on Factor H) and female art students to exhibit characteristics usually associated with masculine personality structure (e.g., high on

16PF Factor E and L). We have already cited Jung (1930) to the effect that the personality of the creative person is a "feminine" one. But perhaps more pertinent here is his concept of the "fully-realized self" which includes for males the recognition and acceptance of their feminine characteristics, and for females of their masculine characteristics. More recently, Maslow (1963) proposed that feminine creativeness can be the purest kind of creativeness ". . . because it gets less involved in products . . . more involved with the process itself. . . ."

It is unnecessary to point out here that these conceptions of the feminine aspects of male personality and the masculine aspects of female personality do not refer to homosexuality but deal with the relationship between the complex forces seeking expression from the "self" and the rigidly-typed behavior held appropriate for given "sex-roles." Conformity to culturally-defined sex-role behavior is expected by society, and children are reared not in accordance with the needs of what Jung calls the "self" but in accordance with external norms defined by others as appropriate sex-roles. The individual's compliance to these norms is held an important dimension of "normality." It has been suggested that by using a frame of reference transcending normality as defined by rigid role behavior, a certain alteration in current sex-type expectations for behavior may be advantageous in encouraging self-realization and perhaps creativity. On the basis of his careful experiments and observations, Torrance (1959, 1961), for one, calls attention to current over-emphasis on culturally stereotyped sex-role behavior as having a major negative effect on the expressiveness and creativity of school children.

One other comment regarding the personality data is in order. A number of the salient characteristics of artists and art students observed in the present and in preceding investigations are of a kind commonly held socially undesirable--unfriendliness, low superego, radicalism, non-compliance to sex-role requirements, and so on. Yet in terms of what the artist does--that he transforms convention--the apparently "socially disruptive" characteristics are functional for the artist, and therefore, paradoxically, for society itself.

The agreement of results from various studies suggests that it is possible to isolate empirically the major dimensions of the artist's personality, at least within the usual limitations of empirical work in the field of personality. It would seem to us that at this point it is not so much the empirical observations that are lacking; rather it is an interpretative schema to accommodate the data in a meaningful pattern that is needed. Our tentative outline of the artist's function is one step toward such schema: it permits the re-evaluation of the empirically derived characteristics of the artist in terms of the objectives of his work and his role in society. When this is done, it becomes clear that the apparently socially disruptive characteristics are functional for his work and therefore, as we have already suggested, functional for society as well. And perhaps more, the same "disruptive" characteristics of the artist may be valuable outside the realm of art--even in education itself--in fact, wherever rigid conformity to norms is not essential.

The observations both in the present study and in other studies with respect to the intellective processes are more equivocal than those with respect to the personalistic processes. To be sure, in the present study, the art students' performance on two perceptual instruments was significantly superior to norms, and several perceptual measures correlated significantly with achievement criteria in art school for one group or another. But never, as in the case of values and personality variables, did the relationships hold for all groups. For instance, Spatial Visualization and Perceptual Memory correlated significantly with both ratings of creativity and Art Grades for female students, but did not for male students. Although the cognitive tests did not differentiate between the total art student group and the norms, nor within the art group itself among the various fields of specializations, a complex set of relationships linking the cognitive tests to other variables did emerge, and this pattern may suggest some fruitful leads for future exploration. For instance, for male Applied Artists Ideational Fluency and Art Grades were correlated .39, for female Fine Artists the correlation was -.07. The correlation between Brick Flexibility and Social values for female Applied Arts students was -.45, for male Fine Arts students the correlation was .22. Again, for females the personality factor of dominance tended to correlate positively with "divergent" cognitive tests, for males the correlations were significantly different and negative in direction. Wonderlic intelligence correlated significantly with ego-strength for male Fine Artists, negatively for male Applied Artists. These complex relationships surely deserve further investigation.

On the whole, though, there just does not seem to be substantial evidence regarding the artist's unique perceptual and cognitive functioning as measured by the usual instruments. It seems clear, for example, that intelligence as measured by the intelligence test has not been a very productive concept when applied to artists, and the IQ metric, however useful elsewhere, does not seem likely to reveal anything unique about art students as against other students. Sometimes one group of students attains a somewhat higher score, sometimes another. In the present study, on one test, our subjects tended to be a little inferior according to college norms; on another, a little superior. There isn't a great deal to be learned about processes from a comparison of these scores.

It has been argued that the cognitive measures currently available are constructed in such way that they are largely inapplicable to artists. I. A. Taylor (1959) finds important sources of conflict between the artist and his culture because of the artist's tendency, indeed need, to reject the rules of traditional logic. But the very assumptions on which our measures of cognition are based are founded in just these rules of traditional logic. As Torrance (1961) has noted, his creative children become estranged from their peers and teachers because they have a reputation for "wild" and "silly" ideas, i.e., ideas that are not logical by the usual standards

What is often meant then by satisfactory cognitive processes, those that are not "wild" or "silly," are the logical steps necessary for activities in everyday life--steps that by cultural consensus are viewed as useful for acceptable performance in society. But we have seen the artist as artist functions at a level that may be irrelevant to acceptable performance by society. The cognitive processes that make him uniquely an artist may remain unrevealed not because there are no such processes but because we do not as yet have the instruments for bringing them to light, except, of course, in the work of art itself. Consequently, we found as others have found that current measures, even Guilford's divergent thinking tests, did not consistently differentiate artists from other groups where such comparisons can be made, nor in the present case, Fine Arts students from Applied Arts students, nor the more successful from the less successful Fine Arts students, although in each case we did find consistent differences with the non-cognitive instruments.

Despite the generally ambiguous if not negative nature of the findings in the domain of cognition that we have emphasized--perhaps over-emphasized here--there are certain leads to further work. Two of the perceptual measures did differentiate between our group and other groups. These were measures of visual and aesthetic perception. In addition, two of the cognitive measures did seem promising, at least in differentiating, albeit at modest levels of significance, between certain of the more successful and the less successful art students. These measures were the Object Question Test and the TAT novelty score.

We do not want to make too much of these findings--the level of differentiation was far from high, and the results are surely in need of replication. Yet what struck us about the two measures was that in contrast to the others, they seem to deal with areas of intellectual functioning that do not fall neatly into any orthodox theory of cognition. The responses scored favorably in these two tests are in a sense non-logical by the standards applied in the usual measures of thinking. For example, to the Object Question Test item "sea shell" the apparently logical query, "In what shells does one hear the sound of the ocean?" is scored lower than the non-logical query, "Is it the sea really inside a sea shell, or is it really a sea shell that is the sea?"

It is of course not enough to say that the artist, and by inference the creative person, tends not to be bound by the traditional patterns of logic and reasoning. What is needed is a more thorough understanding of how the creative-cognitive process operates. Although the two processes may be related, we suspect the spontaneous creative processes cannot be caught by the methods that have been designed, even with success to catch the steps of formal reasoning. If the products expected from "creative," "imaginative," "playful" processes are not the same as those expected from "formal," "problem-solving," "logical" processes, it may be futile to apply the same observational scales to both phenomena, though the phenomena themselves may be related. One does not measure height and weight with the same scale, even though the two deal with size and are in fact related.

That might perhaps be one useful approach to the study of creative thought, and the relationship between creative thought and problem solving, is suggested in a very preliminary way in our systematic observation of the working strategies of individual Fine Arts students. What this procedure may achieve, if pushed further as we intend to do, is: (1) an understanding of the problem that the creative person discovers for solution, for we are convinced that the process of creativity lies as much in discovering the unique problem as in finding a novel solution--indeed, it is the former that precedes the latter; (2) an understanding of the goals the creative person sets for himself while engaged in the process of discovery; (3) the formulation of a taxonomy of modes by which these goals are reached. It may perhaps be that the locus for examining the riddle of creativity is at the *problem* end of the process, i.e., where the novel problem is discovered, rather than at the *solution* end, i.e., where the problem has already been formalized. In this connection, the recent work of Beittel and Burkhart (1963) is also relevant, and it is to be hoped that out of these approaches, a framework of the ends and means of creative thinking can be derived, related to but not a copy of the schemata for describing the thinking processes about which more is known.

3. Some Suggestions toward the Study of Creativity

The most widely used criteria of creativity are ratings of presumed creative products or evaluations by some kind of test of "creativity." Thus, Roe (1946) and MacKinnon (1959) used ratings of achievement in specific fields of science or art; Guilford (1951) and his followers use achievement in creativity tests; others like C. W. Taylor *et al*. (1959) have used number of patents or publications as measures of creative achievement.

Our study suggests that if these forms of achievement are used, the observed correlates of the creativity thus defined might be field-specific. Within art, as a particular instance, different correlates of creative achievement were found depending on the sex and the specific area of specialization. For example, spatial visualization correlated negatively with creative achievement as measured by art grades for male Fine Arts students, but correlated positively for all other groups, and especially for female Applied Arts students. If this is the case within the single field of Art, how much greater may differences be in the concomitants of creative achievement across diverse fields like mathematics, diplomacy, and engineering.

In measuring creativity by original achievement in *any* field (say, art or diplomacy) or innovative performance in *any* test (say, visual or numerical) and then seeking the *same* correlates of the different types of achievement or performance, we are assuming the existence of a single creative process underlying the various creative products (art and diplomacy, visual and numerical). It may be that this general process does in fact exist. But it may also be that the various creative products are founded in quite specific underlying processes and the search for only a single general cognitive process is chasing something of a will o' the wisp.

The general process may be the personalistic one, and on the basis of preliminary evidence from this and other studies, this does in fact seem to be at least in part the case. Such measures as Cattell's "creative personality profile," do seem to hold both for scientists and artists, and for students in different fields of art. It is the cognitive and perceptual processes that may be more field-specific, or if there is a general perceptual-cognitive process it may be so overshadowed by the specific processes or indeed by the non-creative processes and skills necessary for achieving the product that it is lost to view in present measures. In any event, if only for heuristic purposes, and omitting from consideration the situational factors we discussed earlier, it may be advisable to think of the creative product as a function of at least two processes: a general process of creativity common to all who achieve work of original distinction, and talent specific to those who achieve work of original distinction in a particular field.

If we assume this point of view at least for speculative purposes, then the general process may be conceptualized in terms of characteristic creative attitude toward experience. In this sense, one may think of Goldstein's distinction between the "concrete attitude," which engages the person only in the concrete or particular elements of experience, and the "abstract attitude," which engages the person in finding logical generalizations from experience--to which we may add the "creative attitude," which engages the person in discovering new experiences. The following comments may be made about the processes mobilized by this attitude.

1. The attitude sets the person to see uncertainty in apparent certainty. The creative process arises not because of the need to have something of immediate use but because of dissatisfaction with an available answer to a problem--a problem that is especially meaningful to the person.

2. In order to "see" uncertainty, the person must to some extent be "blind" to conventional functions, forms, or connotations, i.e., to the functions, forms, and connotations of experience that have come to be taken for granted. As Einstein is supposed to have remarked about his own discoveries, he had to find something new because he could not understand the old. In effect, the creative person must be able to reject the established even in the face of pressures that the established is "obvious."

3. Perhaps the chief characteristic of the process is the ability to pose a new question--a question that is in some ways startling. Thus while everyone is trying to cure a disease (paralysis) because it is obviously bad for the patient, Freud poses the startling question what good does the disease serve the person, and creates a new view of human functioning.

4. Finding an as yet unknown answer to an already known question, proceeds, it is said, through a series of logical steps in what has come to be known as the problem-solving process. That is, the novel answer derives more or less logically from the question as starting point. This may well be. But how does one go through logical steps to envisage a novel, i.e., an as yet unknown, question? How does one *discover* a problem? It may be that the question-asking process cannot be described in the same terms or evaluated by the same criteria of usefulness and logic as the question-answering process.

5. In short, it may be that the riddle of the creative process lies not in the creative solution but in the creative question. If this is the case, then the novel product, i.e., the solution, may not be the most significant element in understanding the creative process, since it may follow from the discovery of the creative problem. The significant element may be the *envisagement of the creative question*. But it is precisely this element of the creative process--the discovery of the fruitful question as the stimulus to which the novel solution is the response--that has received least attention in the study of creativity.

We may perhaps formalize our comments somewhat by suggesting that different kinds of problem situations can be seen as falling along a continuum between two extremes: *presented problem situations* and *discovered problem situations*. In the former, the problem has a known formulation, a known method of solution, and a known solution. In the latter, the problem does not have a known formulation, and there is therefore no known method of solution, and no known solution. Within these extremes, it is possible to distinguish several types of problem situations varying in what is known and unknown, and to whom, as follows, where O stands for other (teacher, experimenter, society), P stands for person (student, subject, problem-solver), + stands for Known, - stands for Unknown:

Type Case	Problem		Method of Solution		Solution	
	O	P	O	P	O	P
1.	+	+	+	+	+	-
2.	+	+	+	-	+	-
3.	-	-	-	-	-	-

These do not exhaust the possibilities, but in Type-case 1, as an instance, where both problem and method are known, the question is only one of plugging the particular data into a given formula to find an already known correct solution. In Type-case 2, the problem is again known or given, but the method as well as the solution are unknown to the problem-solver, although both are known to the others. In Type-case 3, the problem itself must be formulated before a method toward its solution can be contemplated, and when the solution is obtained, there is no immediate criterion as to its ultimate correctness.

Consider the following situations:

1. The teacher teachers that the area of a rectangle is "side *a* times side *b*," and the student is required to "solve the problem" of what the area of a rectangle is when side *a* is 3 and side *b* is 4.

2. The teacher does not begin with the formula, the area of a rectangle is side *a* times side *b*, but begins instead with posing the problem: How would you go about finding the area of a rectangle?

3. The teacher asks such questions as: What important operations could be performed with a rectangle? Or, what problems could conceivably cause the next world war? Or, the teacher says: You may choose any subject to write on. Or, You may paint anything you wish.

These are very different types of problems, although they are all dubbed problems. And they may entail very different types of intellectual processes indeed.

In the first type, the problem is given--it is presented--and there is a standard method of solving it, known to the problem-solver and to others, guaranteeing a solution in a finite number of steps. All that is required is to plug the given data into the given formula to find the solution. It is essentially a problem in *retrieval*.

In the second type, the problem is still given, i.e., still presented, but no standard method for solving it is known to the problem-solver, although known to others. Here it is by no means a problem in retrieval. It is rather a problem in *reasoning* until a solution is propounded matching the solution that the "others" know.

What about the third type? What *could* the conceivable causes of another war be? Is the answer in Dr. Strangelove or in Dr. Marx? On what *can* one write? Of the infinity of objects, how *does* one choose which to paint? Mother, a Coca Cola bottle, or Black on Black? The problem itself remains to be identified or *discovered* by the problem-solver as well as by the "others," and there are no certain *a priori* standards of correctness, as there are in the other cases, against which to match the formulation of the problem, the method of solution, or the solution itself. An attempt at inventiveness, at "going beyond the information given or known" must be made by all concerned--all must participate in the process of *discovery*.

It is in attempting to distinguish conceptually between the mechanisms underlying retrieval, reasoning, and discovery--and studying the differences and interdependencies among them--that we may perhaps gain further understanding into the process of creativity. To investigate retrieval, we have, among others, the concepts and methods of the associationists, and to investigate reasoning, we have, again among others, the concepts and methods of the Gestaltists to lean on. But how is such an elusive process as discovery to be investigated? What are the appropriate concepts and methods?

The answer to this must be tentative, and yet attempts at experimental work must be undertaken. If the achievement of a creative product entails the discovery of a creative problem or at least the questioning of the conventional structure of an old problem, then, as we have already suggested, the crucial issue becomes: How are these new or restructured problems formulated by the creative person? It is to this envisagement of the fruitful problem, as well as to the examination of the achievement of the consequent new solution, that research in creativity must turn.

A beginning is being made. Such instruments as the Object Question and the TAT Novelty tests seem to us steps in the right direction. In our own use of these instruments, the performance of our superior Fine Arts students seemed to be an indication of the question-asking playfulness, and what we may call "as-if-ness," of their thought. For the solutions to the problems in these tests do not "make sense" in terms of accepted problem-solving logic, and, although requiring thought, hardly seem to be "cognitive" in the usual meaning of the word at all.

It may well be that if solutions of this type do not conform to the usual problem-solving steps--the nature of the response cannot be traced back logically to the nature of the stimulus--it is just because the creative person discovers an unforeseen (new) problem in the foreseen (old) problem or begins by rejecting the conventional context of the problem as it was presented to him. He insists on seeing uncertainty in what is apparently certainty for everyone else. Instead of the accepted "sensible" problem, he envisages a different aspect of the stimulus as problematic for him. While everyone is busily painting the age-old solidity of cathedrals, Monet sets himself the problem of painting the ephemeral light on the cathedrals. By changing the structure of the problem, he changes the method of solution, and the solution itself. In a sense, what seem egregiousness or just playful dawdling may actually be an attempt at a solution of a problem discovered by the creative person--a problem that may in fact remain unidentified by others until the creative person has not only pointed it out but has solved it.

If we may offer a rather simple-minded instance of this in the classroom, a group of children are given a long column of numbers to add. While all the other children are working industriously in the way they have been taught, one child is seen trying to re-group the numbers in a somewhat different array, hoping thereby to facilitate his task. He may be reprimanded for not solving the problem in addition, and yet the child was in fact trying to solve a problem--indeed the problem. Perhaps the long column of addition might be solved by multiplication. What seemed dawdling or "orneriness" from our point of view may have been an attempt at a solution from the child's point of view.

At a somewhat more complex level, in our investigation of the working strategies of the Fine Arts students, we observed that the more successful students tended to disregard the given still-life arrangement of the objects--even when they themselves had made the arrangement. They permitted the arrangement to undergo transformation from the table to the drawing board, and tended to disregard the obvious meanings of the objects in order to achieve a novel synthesis within the framework of a problem that was original and meaningful to them.

To summarize, it seems to us that one fruitful way of conceptualizing the creative process for further investigation is by considering it as entailing two components. One component is a relatively free questioning activity, what has been called the "creative attitude," which is characterized by a deep concern with some aspect of reality, but not bound by its conventional, "sensible" limits. It is this attitude that sets the person to envisage new problems, to see uncertainty in apparent certainty, and then to make at least in part a new certainty out of the uncertainty that the person himself has created. It is in working out this new problem that a new product is created. The attitude itself may or may not result in anything tangible; if it does not, it can, according to this view, still be creative, provided the person derives from the process a subjectively meaningful insight.

The first component may be considered a general factor characteristic of all creative people and underlying all creative work. There is also a second component or specific factor characteristic of all work in that field. The specific factor may be defined as "the ability to translate the creative insight--the question--deriving from the general process into a novel and valuable product," whether a new machine, a mathematical formula, a sonnet, or a sonata. This factor depends on familiarity with the particular subject-matter--mathematics, music, and so on--a knowledge of its rules, and of the relevant technical skills. Moreover, in order to create the product, the person must be persevering, disciplined, and yes, "lucky," in the sense of being in the right place at the right time. As has been observed, "Had the infant Newton been placed among the Hottentots, would he have expounded the Laws of Motion?"

At first glance it may seem that only the second component is of concern to the investigator or the educator. Of what value is a process that might result only in a question or at most a personal experience? Quite the contrary. It is the second process that remains sterile without the first, resulting in the tragedy of the technical skill gone to waste for want of the creative attitude to give it thrust in new directions. And all considerations of tangible products aside, it is the first process that permits man to transcend his situation, to aspire to greatness that is not immediately to be had, to work not merely to satisfy some immediate necessity of existence but because, like the innocent child's play, it is satisfying in itself. Ultimately, the issue is of course not general process or specific process--creativity or technique, imagination or reason, product or experience--as if they were in opposition. On the contrary, as Sartre said about Proust, "The genius of Proust is neither the work considered in isolation, nor the subjective ability to produce it; it is the work considered as the totality of manifestations of the person."

4. Summary

This was a one-year research and development project rather than a long-term program of systematic investigation. Accordingly, we were more interested in discovering significant problems that might be pursued in greater depth later than in dealing with any already-discovered problem to an immediate conclusion.

This had a signal advantage, for it permitted us to explore a wide range of issues both of a speculative and empirical nature. But it also carried with it an unavoidable disadvantage, for an exploration involves even more than the usual amount of risk with respect to the possibility of generalizing from the observations. Many of the instruments were in fact exploratory, the subjects came from a single school and there may have been some restriction in the range of performance, the ratings and grades in the school records were of unestablished reliability, the analyses applied were, of course, not exhaustive, and so on. In short, not only the theoretical formulations but the empirical data must be held as tentative pending replication by more rigorous and intensive methods. Nonetheless, a number of summary statements for further inquiry may be offered:

1. Underestimating the contribution of the artist to human society is a present danger. The work and motives of artists must not be neglected by the schools in this aggressively pragmatic age, for the exclusive emphasis on "usefulness," on "providing for the necessities of existence," on "making a living," can have a serious restrictive effect on both the cognitive and emotional development of children. Artists, whose products cannot be assessed against standards of practical use and immediate consumption, provide a framework for achievement and personal value beyond the expendable and ephemeral.

2. Knowledge of the thought processes and personality characteristics of artists can spur educational interest in the development, or at least in the appreciation, of aspects of our humanity and culture which may otherwise be considered worthless, if not disruptive. These experiences may not comply with pragmatic standards of usefulness or sociability, but provide for the enrichment of life beyond mere existence.

3. Understanding the thought processes of artists is relevant to other types of problem-solving processes where the issue does not involve simple rote retrieval or even step-wise reasoning but the discovery of fruitful problems for investigation. The artist's process of discovering new problems leading to creative solutions provides clues for comprehending the crucial aspects of creativity in other fields. As Niels Bohr, the Nobel-winning physicist, has put it: "Indeed, in

renouncing logical analysis to an increasing degree and in turn allowing the play on all strings of emotion, poetry, painting, and music contain possibilities of bridging between extreme modes as those characterized as pragmatic and mystic."

4. More specifically with respect to the empirical aspects of the present study, notable differences in value orientations and personality characteristics were observed between art students and other students of the same age, sex, and educational level. Many of these differences replicate and confirm preceding findings for artists and creative researchers.

5. Among the major values differentiating the art student from other students are: (a) very high Aesthetic values, very low Economic and Social values--in each case significantly different from college norms; (b) great commitment to a dominant value--the difference between the art students' highest value (Aesthetics) and their second highest value (Theoretical) is greater than for any group reported in the literature but one.

6. Among the major personality characteristics of art students are: (a) significantly low (by appropriate college norms) in sociability, superego strength, and in surgency (extroversion); (b) significantly high in imaginativeness, radicalism, and self-sufficiency. In addition to these characteristics that held for both the male and female art students, there were a number of sex differences, notably: female art students were more dominant--a rather "masculine" attribute--than female norms, male art students were more sensitive--a rather "feminine" attribute--than male norms. On the "creative personality profile" developed by Cattell on the basis of the 16 Personality Factors, the total group of art students was at the 89th percentile by college norms.

7. Within the total art group itself, students in different fields of specialization--Fine Arts, Art Education, Advertising Arts, Industrial Arts--tend to differ in value orientations and personality characteristics. For example, with respect to values, Fine Arts students have the highest Aesthetic values, Advertising Arts students the highest Economic values, Art Education students the highest Social values. With respect to personality, the Fine Arts students are most socially aloof, lowest in superego strength, highest in imagination, the Advertising Arts students usually being at the opposite end of our continuum on these variables.

8. With respect to the values and personality characteristics of more successful and less successful male Fine Arts students, the former were about one S.D. higher in Aesthetic value and more than one S.D. lower in Economic and Social values. Differences were also observed in ego-strength, superego strength, surgency (extroversion), and self-sentiment (conformity), the more successful students having the lower scores. On the Cattell "creative personality profile," the more successful students were at the 99th percentile, and the less

successful group at the 89th percentile by college norms.

9. Although notable differences in values and personality were found between the art students and other students, and among art student sub-groups by sex and field of specialization, no such sharp differences were found in the cognitive and perceptual domain. There were, however, a number of promising leads for further work. For example, the cognitive measure permitting the greatest freedom of response (the Object Question test) did differentiate the more successful from the less successful male Fine Arts students. There were also a number of complex patterns of interaction between the perceptual and the personality and achievement variables. For example, the correlation between Spatial Visualization and Art Grades for male Fine Arts students was -.32, for female Fine Arts students +.18, for male Applied Arts students -.02, for female Applied Arts students +.52.

10. The relative lack of clear differentiation or at least the greater complexity of findings with respect to cognitive and perceptual variables in this and in other studies may be due to a number of reasons: (a) The salient characteristics of art students are in fact in the value and personality domain, and not in the perceptual and cognitive domain; (b) there are significant differences in perception and cognition but present instruments are incapable of disclosing the kinds of variations that make the difference; (c) the samples used in present studies are inadequate and the instruments too unreliable to divulge the unique characteristics. In any event, research in this field has been lagging. The study of the perceptual and cognitive processes of artists and art students is an important largely untouched area for empirical inquiry.

11. A preeminent issue in the entire field is the nature of the criterion--or perhaps better, the criteria--of creativity. When performance on a number of the most widely-used instruments--ratings in artistic potential, art grades, general intelligence, divergent thinking, personality--all purportedly measuring creativity, were correlated, the relationships among the measures were quite low. A factor analysis produced a number of distinct factors. Thus, creativity as measured by intelligence tests seems unrelated to creativity as measured by personality tests, creativity as measured by divergent thinking tests seems unrelated to creativity as measured by ratings and grades in Art School. Perhaps the most promising single index is the set of "creative personality characteristics," but even here the observed relationships with the divergent thinking tests and with the ratings and grades in art school are quite low.

12. When the ratings in originality and the grades in art school were taken as perhaps the most defensible criterion of creativity, at least in terms of face validity, the following relationships were observed: (a) For male art students, the highest correlations between the criterion and other measures were in the value and personality domain; (b) for female art students, none of the personality correlations was significant, but a number of significant relationships

emerged in the perceptual domain. For neither group did general intelligence and divergent thinking tests correlate with the teacher ratings in originality and artistic potential or with art grades.

13. The systematic observation of students engaged in creative production in the school studio, although admittedly not an exact replica of the free artistic situation, offers a fruitful procedure for investigating the creative process. In the present study, the main purpose of the observation was to explore the possibility of disclosing and classifying the types of problems envisioned by artists, the way in which such problems are "discovered," and the methods by which the problems are "solved"--that is, objectified in a creative product. The preliminary observations suggested that one difference between the more successful and the less successful Fine Arts students may lie in the nature of the problems they formulate, the one apparently dealing with "discovered" problems, the other with "presented" problems. An understanding of the complex and perhaps non-logical processes involved in discovering creative problems in the art situation may serve as a heuristic for investigating similar processes in other fields.

14. Specifically with respect to implications for further research, it seems that creativity has been considered a unitary process comprising the same characteristics whether it unfolds in the arts, the sciences, or the applied fields, or whether it is measured by products, test performance, or personality configuration. In view of the findings in the present study, tentative as they must be, we suggest that it might be fruitful to view creativity as composed of two interlocking processes: a general process underlying all types of creative endeavor, and a specific process relevant to a particular field of endeavor.

15. The general process may be conceptualized as a "creative attitude," engaging the person to seek new experiences just as the "concrete attitude" is said to engage the person in the particulars of experience and the "abstract attitude" to engage him in seeking logical generalizations from the particulars of experience. Instead of impelling the person to seek information to reason from the concrete information, or to abstract logical categories, the creative attitude with its attendant processes impels the person to seek uncertainty in what appears to be "obvious" certainty and to raise questions that are in some way startling. Very little is known about this attitude, and more work needs to be done here. What drives the creative person to seek uncertainty in certainty--to ask the unasked question--when the rest of us are so much more at ease with certainty?

16. It may be that the riddle of the creative process lies not in the creative product but in the creative question. If this is the case, then the novel product, i.e., the solution, may not be the most significant element in understanding the creative process. The central element of the novel solution may be the envisagement of the novel question, and it is the process of discovering this question that must be understood. It is precisely this element of the thought process, i.e., the discovery of the fruitful question as the stimulus

to which the inventive solution is the response--that has been neglected in the study of creativity and would seem to have the highest priority for further work in the area.

17. Although the general factor or creative attitude may account for seeing uncertainty in certainty as the substratum to innovative thought, a field-specific process is needed to translate the uncertainty into the formulation of the fruitful question and the translation of the question into an objective solution. This process involves both personalistic and cognitive components: on the one hand, perseverance and commitment are needed; on the other, knowledge and technical skill or talent in the given field are needed. In order to achieve his product, the artist, as an instance, needs to work in solitude; to achieve his product, the creative statesman needs to work with others. The investigation of the processes underlying the creative product must be concerned with both the general and the specific mechanisms.

18. Finally, the creative processes as such are not the only subjects worthy of study in the arts. A fruitful and largely untouched area for investigation is the artist's unique orientation to life and society. The most relevant aspect of this for education is the artist's relative disregard for the immediately useful object or action, his deeply committed search for the meaning of experience, his concern with basic human values. It is an orientation said to be quite different from the dominant current orientation in society and in our schools. As Arendt points out

> Whatever we do we are supposed to do for the sake of "making a living"; such is the verdict of society, and the number of people, especially in the professions who might challenge it, has decreased rapidly. The only exception society is willing to grant is the artist, who, strictly speaking, is the only "worker" left in a laboring society. . . .

What forces impel the artist to remain at "work" when everyone else has turned merely to "labor" as a way of life?

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APPENDIX A

REVIEW OF THE LITERATURE ON CREATIVITY IN ARTISTS

Introduction

In recent years the literature on creativity has expanded to such an extent that it has become impossible to summarize all the work done in the area in a report of this kind. More or less thorough reviews are provided in a number of references and bibliographies:

1. Taylor, C. W. (ed.). Reports of the University of Utah Conferences on the Identification of Creative Scientific Talent, University of Utah Press, 1955, 1957, 1959.
2. Anderson, H. H. (ed.). Creativity and Its Cultivation, New York: Harper, 1959.
3. Stein, M. I., and Heinze, S. J. Creativity and the Individual, Glencoe, Ill.: The Free Press, 1960.
4. Burgart, H. J. "Creativity: Learning and Teaching Bibliography," Mscrpt., University of Georgia, 1962.
5. Ketcherside, W. J. "A Bibliography on Creativity," Mscrpt., University of Missouri, 1963.

For the purpose of the present report, 149 recent empirical and theoretical articles and books dealing primarily with artists and artistic creativity were consulted. These are listed in the ensuing bibliography and coded for ready cross-reference according to certain major categories such as the nature of the subjects under study, the instruments used, the criteria of creativity applied, and so on. The coding system and bibliography are given in Appendix B below.

In addition, a number of salient issues regarding the artist and his work raised by these 149 recent studies were singled out for a brief review and discussion. These issues were: the nature of the cognitive processes of the artist, the nature of his perceptual processes, his early experiences, his socio-cultural background, and his motivations in becoming an artist. In the present section then we present a brief review and discussion of the selected literature on the creativity of artists, according to this five-fold division of salient issues: (1) cognition, (2) perception, (3) early experience, (4) socio-cultural environment, (5) motivation.

1. Cognition

A. Review

Very little experimental work has been done regarding the cognitive processes of artists. The present section will attempt to review the major contributions in this area. One basic question underlying the study of the cognitive processes that go on during artistic creativity, is whether such processes are similar to those that are relevant to scientific creativity, or whether creative thinking in the arts is qualitatively different from creative thinking in the sciences.

Guilford (65)* has described some of the intellectual abilities which creative artists ought to possess. He deduces the relevance of these abilities from the structure of intellectual factors emerged from his research over a period of years. The factors that Guilford suggests as most relevant to artistic creativity are: fluency, flexibility and originality--all three being "divergent" thinking abilities.

Lowenfeld and Beittel (19) find that the same intellectual qualities that Guilford predicates as relevant to creativity in general, seem to be crucial in the arts as well. They conclude that "creativeness in the arts and in the sciences has common attributes . . . criteria of creativeness in the arts significantly correlate with criteria of creativity found in an independent study in the sciences." So far no experimental work has been done to substantiate the above claim.

In a later study, Brittain and Beittel (25) found little relationship between Guilford's creativity tests and art performance rated as creative. In their discussion, the authors bring up the following points:

> It may be that creativity in general terms is difficult to conceive and to test for, and that within the confines of an art population the range of creativity is different both qualitatively and quantitatively from other populations . . . tests are tests and are not creativity: components or dimensions of creativity derived from tests may not be structurally similar to creativity as it exists . . . particularly in a specific discipline. . . .

Other studies dealing with more specific issues involving cognitive processes and artistic creativity are: Burgart (27) finds correlations between art experience and creativity as measured by Guilford's tests; Drevdahl (39) reports a significant difference between creative and non-creative art students on originality, but not on fluency and flexibility (these three being Guilford's suggested three crucial factors); originality as measured by Guilford's tests was also correlated with a form of artistic creativity (spontaneousness) in a study by Burkhart (28) while no relationship was found between IQ and creativity. An early paper by Fisichelli and Welch (45) reports very low correlations between IQ and creative production. Introspective reports of the cognitive processes of artists are discussed by Kepes (81); some intellectual aspects of creativity, and poetry in particular, are examined by Arnheim *et al*. (11) and Wilson (149).

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*The numbers in parentheses refer to the bibliography in Appendix B.

B. Discussion

The studies reported above are representative of the few investigations dealing exclusively with the cognitive processes of fine artists. It is obvious that investigators have considered it more fruitful to study the personality rather than the cognitive processes of artists. As a result, there seems to be little agreement about what intellectual qualities, if any, are needed to create a work of art. It is doubtful whether the relevant qualities are already known, and whether they are the same as the qualities supposedly necessary for scientific creativity. Few seem to think that cognitive abilities alone can explain (or predict) artistic creativity; usually creativity in the arts is seen as more thoroughly explicable in terms of personality factors. Recently, however, the trend in this field seems to have shifted toward assigning a relatively larger share of importance to cognitive processes. As is apparent by the very small number of titles dealing with this topic, the field of research on cognition in artistic creativity is still largely uncharted.

2. Perception

A. Review

As in the case of cognition, very little is known as yet about the perceptual characteristics of artists, or about the role perception plays in their creative processes. However, there are some studies bearing on perception in general that seem to have relevance to creativity, such as the concepts of "field-independence" developed by Witkin, of "independence of judgment" formulated by Asch, and "preference for complexity" suggested by Barron.

The notion of preference for complexity as a perceptual variable somehow related to creativity has had a long history. Setting out to replicate an hypothesis by C. O. Weber, who had found complexity preference related to "apperceptive power," Brighouse (24) performed some experiments which showed that "the artistically trained observers looked for unity and simplicity of organization while the untrained preferred the 'interestingness' of varied, involved, and complicated forms."

In contrast to Brighouse, Barron (14) found a preference for complex versus simple perceptual patterns among artists; a preference which was associated with originality, good taste and artistic creativity, suggesting also an association with "the psychoanalytic concept of orality and its derivatives." In 1955 Barron replicated his findings, and concluded that preference for complexity also revealed a more complex psycho-dynamic personality organization as measured by psychiatric interviews (16). Again in 1958, Barron finds that original painters and scientists prefer more complex and asymmetrical forms, both on the Figure Preference Test and in their Rorschach responses. Independence of judgment, originality, and preference for complexity are seen as highly related (15).

Among those who have supported Barron's findings, we may mention Rosen (124), who presents significant correlations between originality ratings of art students and their complexity preference scores, and Burkhart (28), Brittain and Beittel (25), however, warn that "tests of aesthetic discrimination and art judgment based on standardizations discriminating between art and non-art populations show an inverse relationship with creative performances in a select art population." Among the studies quoted by Brittain and Beittel to support their claim is that of Hoffa (75).

Tolerance of ambiguity as a perceptual characteristic discriminating artists is mentioned by Barron (15) and by Eiduson (41), both working with Rorschach responses of artists.

B. Discussion

At the present stage of research in creativity the phenomena of perception have been studied mainly in relationship to personality. What Kepes (81) writes in an intuitive vein, could be echoed by many investigators: "Vision is above all a cognitive act. . . . The created visual image, the visible forms we make with our hands and eyes together, link the outer vision that explores the external world with the inner vision that shapes our felt experience into symbols. . . . This essential unity of primary sense experience and intellectual evaluation makes the artistic form unique in human experience. . . ."

Recently, however, perception as a purely physiological process has been considered by some theorists. Among these Attneave[1] considers cues from Information Theory and their application to pattern perception; Platt[2] proposes that the pleasure derived from perception of forms can be accounted for by the optimal need level for perceptual stimulation of the retina. These hypotheses have not yet been operationalized and tested, and although they seem promising leads for further research, their relevance to the complexities of the creative process is not yet established.

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[1] Attneave, F. "Stochastic composition processes," J. of Aesthetics and Art Criticism, 1959, 17 (4), 503.

[2] Platt, J. R. "Beauty, pattern and change," in Fiske, D. W., and Maddi, S. R. (eds.), Functions of Varied Experience, Homewood, Ill.: Dorsey Press, 1961.

Perhaps nothing points more clearly to the complexities involved than the different conclusions reached by such investigators as Barron (14) and Rosen (124) on the one hand, and Brighouse (24) and Brittain and Beittel (25) on the other. The question as to whether artists prefer simple or complex visual stimuli seems easy to answer, but apparently no simple answer is available. Brittain and Beittel suggest a curvilinear relationship between preference for complexity and artistic creativity. It is also possible that to speak about complexity and simplicity in objective terms as concrete qualities of visual percepts is futile. What may really matter is the subjective recognition of complexity on the part of the artists, which will depend on factors other than the "real" characteristics of the objects perceived.

3. Early Experience

A. Review

In the classic study on the heredity of genius, Galton[1] found that of the several categories of "genius," that of the artist was one of the less predictable. Although 18 of the 42 "Great Masters" studied had illustrious relatives in the arts, the eminent relatives were almost never removed more than two degrees of kinship from each other and may therefore have provided an experiential model. Thus what Galton took for the hereditary character of genius may as likely be the effect of early experience and training.

The authority in the family of creative art students, according to Burkhart (28) is rather permissive or centers around a dominant mother and a submissive father. This family constellation has been observed also in a study of creative scientists by Giovacchini (54). Munsterberg and Mussen (107) find that artists who were in conflict with their parents tended to leave home rather than enter into open conflict with them. Eiduson (41) reports that artists do not use parental ideals to set their own goals, while Ammons and Ammons (4) believe that "as a child, the genius learns intellectually creative behavior from his environmental adults to a much greater extent than does the 'average' or 'normal' child."

Ann Roe found that competition with the father characterized a group of six recognized artists whose fathers had also been painters and who , like their sons, were "excessive drinkers" (122). Torrance

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[1] Galton F. Hereditary Genius, New York: Appleton, 1870.

(139a, 139b) lists the following factors as affecting negatively creative thinking in early childhood: over-emphasis on sex roles, premature attempts to eliminate fantasy, restriction on manipulativeness and curiosity, emphasis on verbal skills, on "safety," and on success. He also states that "a large share of the highly creative child's adjustment problems appear to be centered in his psychological isolation and estrangement from his peers and teachers . . ." partly because of his ". . . reputation for having wild and silly ideas."

Seklar (130) contends that such adjustment problems may be useful for the development of creativity: he believes that during the formative years the artist "needs the tension generated between extremes of choice, and the ensuing challenge of commitment that gives his work vitality." Finally, in the area of child-parent relationships, mention might be made of the work of Berlin (21), who states that ". . . in several instances schizophrenic children were found to have parents who were talented people with creative potential never fully realized. . . ."

B. Discussion

It appears that although several investigators have touched the problem concerning the artists' early experiences, the reports are still meager and inconclusive. This is largely due to the difficulties inherent in the subject of investigation, since data collected about the early life of artists can only have a limited post-hoc validity.

With the possible exception of formulations derived from Freud, no comprehensive theories exist which would posit a causal connection between certain early experiences and later artistic creativity. Creativity, according to the Freudian formulations, is seen as an outcome of infantile sexual curiosity transformed into a desire for discovery. Much oversimplified, the argument is sometimes formulated as follows: Initially "sexuality" and the "investigatory instinct" are related. While for most children repression of the early sexuality results also in the restriction of curiosity, a few succeed in "sublimating" the dangerous curiosity into more neutral, but not less potent, desire for discovery.

More recently, a different set of explanations have been presented to account for the desire for discovery in children. This trend derives partly from ego psychology, and partly from the work of experimenters who have studied desire for novelty as an autonomous motive for engaging in investigation. Such theories (see for instance in White[1]) posit certain optimal conditions in infancy which reinforce curiosity-satisfying behavior.

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[1] White, R. W., "Motivation reconsidered: The concept of competence," in Fiske, D. W., and Maddi, S. R. (eds.), Functions of Varied Experience, Homewood, Ill.: Dorsey Press, 1961.

The data gathered by investigators and reviewed above seem to agree on several points. Tension in the family, school, and peer-group may be a concomitant of the early experience of artists. The parameters along which such tension typically occurs have not yet been agreed upon. Free intellectual stimulation, encouragement of fantasy, and relative freedom from sex-role stereotypy seem to be conducive to later creativity. Beyond these more or less uncorrelated findings little else is established in this area.

4. Socio-cultural Environment

A. Review

In the previous section, early experiences characteristic of artists were reviewed. In this section we shall bring together studies dealing with the interaction of the mature artist and the society in which he lives.

It is a presumed phenomenon of Western culture that artists are considered to be antagonistic to societal norms. The role of the artist is unclear, and society often considers him a parasite. Taylor (138) describes the situation as follows: "Many of the characteristics found associated with creative personalities--sensitivity, temperament, gullibility, openness, lack of concern with details, involvement with self, the ability to resist premature decisions--are largely viewed with displeasure in our culture. . . ." Also, creativity requires much time to bring forth fruits, and this breeds impatience with the creative person. Another source of conflict is found in the often necessary rejection of the rules of traditional logic, which places the creative person against the prevalent thought currents of his age.

Conflict with the environment, in the sense of rejecting stereotyped values, thought, and motives, is seen as a basic necessity of the creative person by existentially-oriented psychologists. In order to be creative, the human being has to experience his own authenticity and free itself from the mode of experience absorbed from the "they" in his environment. In this vein Anderson (7) writes: "The conscious and cultural world of the individual is intolerant of truth and beauty as the person himself sees it." Anderson then goes on to pose a number of questions about creativity: "Is this insightful experience the expression of the free me that can respond to the universe without socialized sham and cultural impediments? . . . Is this the meaning of the encounter, that one can shed the falseness, the error, the trappings of his culture and be open to the totality of his own experience?"

Within roughly the same conceptual frame of reference, Maslow (100, 101) reports his findings about "self-actualizing" people, whom he regards as being creative, not on the basis of their production, but because they have attained fulfillment of their potentialities as human beings. The behavior of such people is ". . . spontaneous, effortless, innocent, easy, a kind of freedom from stereotypes and clichés," almost childlike. They are therefore less enculturated and ". . . less afraid of what other people would say or demand or laugh at. . . ." They also have ". . . less need of other people, and therefore, depending on them less, could be less afraid of them and less hostile to them."

Numerous studies bear on the theoretical issues outlined above. Brittain and Beittel (26) conclude that the creative artist ". . . does not conform easily to restrictions . . . may also enjoy remaking his environment, both physically and socially . . . his values tend to emerge within the context of the situation rather than be predetermined by tradition. He does not like authoritative actions by others nor by himself, but can tolerate divergent opinions and unrelated goals." Hoffa (75) found confirmation for the following hypothesis: an art-involved population will measure significantly lower on measures of authoritarianism and higher on measures of independence than a comparable population without art training. He concludes that ". . . non-conformism is evidence of individual liberation from superimposed and often arbitrary group norms, and is exactly the quality which must be encouraged, not only in the artist, but in the scholar and the scientist if he is to nurture the capacity for fresh, creative solutions to his problems." Similarly, Burgart (27) found the following personality dimensions significantly related to art experience: self-sufficiency or achievement through independent endeavor, social independence, and nonconforming behavior. Owen (111) in an art program designed to stimulate original thinking, found that the students at the end of training showed "greater originality or freedom from stereotype." Rees and Goldman (120) report a negative correlation between creativity and friendliness as measured on the Guilford-Zimmerman Temperament Survey, while several studies find correlations between artistic creativity and schyzoid trends (Drevdahl, 39). Along the same lines Hammer (67) describes promising adolescent artists as emotionally reserved; they have ". . . need for isolated retreat . . . feel detached and above pleasantries and social relationships. . . . These subjects' strength lies in their capacity to make constructive use of their feelings of rejection; they appear to have converted their retreat from closeness to others into an emphasis upon self-directedness, independence, criticality, and individuality." Barron (15) reports that persons who score high on the Barron-Welsh art scale and on Guilford's creativity tests are more resistant to group pressures in an experimental situation. MacKinnon (96) finds that creative professionals, including architects and writers, were in their college years of ". . . independent character, whose independence manifests itself not in footless rebellion but in the accomplishment of goals that the individual sets himself and achieves in his own unique fashion."

B. Discussion

Most studies in this field seem to deal with the attitude of the artist to norms, values, and pressures of society in the abstract. In this area, there is considerable agreement in the findings. Little is known, however, about specific interactions between the artist and his culture or members of society significant to him. The majority of the studies are concerned with measuring or explaining the artist's rejection of group standards, since this is the most obvious aspect of his social behavior. However, as Feibleman (43) points out, the artist is "more than normally sensitive to the tangibles and intangibles in his environment, and is more sensitive to the meanings which they have beyond the meanings customarily assigned to them." Thus there seems to be room for research on the positive aspects of the artist's relationship with his cultural and interpersonal environment, those aspects where the emphasis is not on the rejection of societal norms and ties, but on the artist's own interpretation of society and culture. The role of the creative artist could be defined as that of innovating, or producing new symbol systems which will add to the range of emotion-provoking objects in the environment. Therefore another aspect of the issue is that of the artist's influence on society, a relationship about which there seem to be no systematic empirical studies.

5. Motivation

A. Review

There are two major theoretical viewpoints on the question as to what motivates artists in their work. The first derives from Freud, and according to it creativity is a diversion of libidinal energies. This reductionistic theory takes many forms, but always explains the creative impulse in terms of some defense against, and sublimation of, unconscious energy. The second viewpoint, on the other hand, stresses the autonomy of the creative act, which is seen as satisfying in itself.

We cite only three recent works, as representative of many, to exemplify this spectrum of interpretations. Pedersen (115) writes: "The destructive as well as the libidinous form of ecstasy are the basic motives of artistic creativity. . . . The phallic narcissistic character is especially liable to experience states of ecstasy . . . it is not surprising, therefore, that we often find this type of personality among creative artists." In accounting for creative imagination, Beres (20) shifts the focal point on the ego: "It is the activity of the synthetic function of the ego that transforms the chaos of primary-process imagination into the orderliness of secondary-process imagination." Anderson (7) agrees that the motivational sources of creativity stem from the unconscious, but he sees in it love, life, and growth rather than death, hostility, and hate. In his view, creativity is basically a quality of protoplasm as a process of differentiation and integration.

Few investigators have tried explicitly to use the above theories in their experimental work. We may, however, mention Pine (119), and Pine and Holt (118), who operationalized the concepts of "drive content," "ego control," and reported that creative subjects were found to have both stronger drives and more adequate controls than less creative subjects.

Most studies dealing with the motivation of artists do not seem to ground their findings in any general theory; nevertheless, they are more or less implicitly influenced by one or the other of the above-mentioned viewpoints. Perhaps the greatest consensus among investigators is reached in describing the motives of creative artists as arising from a need to bring new order to experience. Thus Ghiselin (52) states, "the creative mind is drawn . . . by desire for an order that does not exist." The motivating force for creative activity is "The need to transcend the life that is defined in established configurations, whether conscious or unconscious." The creative process is a single action due to "an exercise of the configurative powers of the whole psyche." Ghiselin later restated his views as follows (53): "Imagination is the exercise of spiritual autonomy in the production of essential order; in its fullest action it is a necessary structuring and restructuring, shaping and reshaping of everything that we know and are." Eiduson (41) found in artists a strong need to integrate internal and external experiences in a comprehensive way. Hammer (67) reports that projective test responses of creative art students revealed high emotional instability, which may account for their desire to achieve form and balance in their work, in order "to translate inner feelings of chaos into some form of external symmetry--whether it be formal or informal balance." The "urge toward clarity and order" suggested by Arnheim (11) is also mentioned as the motivation for engaging in art by Maslow (101), Torrance (139), and Kepes (81).

The qualities of strength and persistence have often been given as characteristics of the creative artist's motivation. Barron (15) argues that the creator is often passionate, willful, and possessed of fierce self-assertion. MacKinnon (96) suggests that the creative person "will show a disposition to undertake problems where the degree of difficulty and frustration is great and the drive toward completion or accomplishment is persistently long." Torrance (139) finds that creative children supply their own motivation for learning and are challenged by difficult tasks. Munsterberg and Mussen (107), in their work with art students, found that in order to produce art work, the students were "willing to sacrifice material pleasures, personal success and personal acceptance." Maslow (100), within the framework of existential psychology, sees the inspirational phase of creativity as a total absorbtion in the present and the matter at hand, which results in an "innocence of perceiving and behaving," a "fusion between the person and his world." McGuire (93) points out that willingness to take risks is necessary to creativity; Gordon (57) observes that the creative "drive" is to create something just for the sake of creating it.

B. Discussion

Many writers seem to agree that unconscious drives supply the motivation for the artist's creative production. But there are widespread differences of opinion as to the quality of the drives which become "sublimated" in creativity. More or less orthodox Freudians define these drives as libidinal, aggressive, or self-destructive; others see them as integrative, life-enhancing, variety-seeking forces.

The latter way of interpreting artistic motivation has gained impetus recently from various and disparate sources. The emphasis in experimental psychology on constructs such as "exploratory drive," "need for variety," "effectance motivation," and others has opened up the possibility to interpret creative behavior as a relatively autonomous process. The same result has been achieved theoretically by the work of ego-psychologists, who have contested the reduction of complex abstract behavior to libidinal drives. The existential philosophy of Heidegger, Jaspers, and others, has impressed several psychologists with the possibility of achieving "authenticity" or "self-actualization" as intrinsic conditions of human Being. Finally, parallels drawn from biological processes of growth and development have led to postulating the occurrence of analogous processes in the nervous system which would account for creativity.

Thus the problem of creative motivation can be approached from a great variety of theoretical orientations. The observable data in this field can be interpreted at a number of levels of meaning. The interpretations available, whether grounded in Philosophy, Biology, Neurology, Psychoanalysis, or Ego Psychology, need not be contradictory. Indeed, they could be integrated in an explication relating the different levels of meaning. Creative motivation seems to be an area where the possibility of establishing rapport between the languages of different disciplines is most promising.

APPENDIX B

BIBLIOGRAPHY

The following list of books and articles on creativity is by no means exhaustive, nor does it claim to be the only selection that could have been made of relevant publications in the area. An effort was made to include representative works from all contemporary approaches to the study of creativity, and especially those dealing with artists. Usually only one title from each author is included, the exception being in the case of studies that closely parallel our own.

Titles in the bibliography have been categorized and coded as to content in order to facilitate retrieval of information. This section includes, therefore, three headings:

I. A key to the categories of the coding system

II. An index of titles contained in the bibliography, cross-referenced according to the coding system

III. An alphabetical bibliography of the titles, each item followed by its code.

Like any other means of compressing information, the coding is not exhaustive of the original content, and the placement of some of the items may be arbitrary. The coding does, however, provide a ready reference to the papers, according to a number of the more common parameters of theoretical and empirical studies.

I. Key to Coding System

Each title in the bibliography is coded, when applicable, for the following major content-categories:

1. Subjects (This category describes the age of subjects when used in experimental studies)
    - a. Elementary school age
    - b. Secondary school age
    - c. College students
    - d. Adults
2. Groups studied or compared (Both in experimental and theoretical studies)

- a. Artists (also poets, musicians, etc.) and non-artists compared.
  (A title is coded for this category when the main purpose of the study is to make comparisons between artists as opposed to non-artists. College students majoring in the arts are included under the designation of "artists".)
- b. Artists--more or less creative. (Comparison within a group of artists or art students differentiated on the basis of creativity.)
- c. Eminent creative individuals in the arts and sciences.
- d. "Normal" subjects. (Differentiated into more or less creative or original groups on the basis of _ad hoc_ criteria of creativity.)

3. _Basic Method_
   - a. Primarily experimental-empirical
   - b. Primarily discursive--e.g., historical, theoretical, introspective, etc.

4. _Fields of Inquiry_ (Subject-matter of the study)
   - a. Cognition
   - b. Perception
   - c. Personality--temperament, attitudes, values, etc.
   - d. Relations among a, b, c

5. _Instruments_ (When used in experimental studies)
   - a. Intelligence tests, problem-solving measures
   - b. Guilford-type divergent cognitive/perceptual tests
   - c. Guilford-type convergent cognitive/perceptual tests
   - d. Personality inventories or scales--e.g., MMPI, 16PF, etc.
   - e. Projective techniques--e.g., TAT, Rorschach, etc.
   - f. AVL Study of Values
   - g. Perceptual measures
   - h. Aesthetic judgments or aesthetic tasks

6. _Criteria of Creativity_ (Basis for differentiating creative from non-creative subjects)
   - a. Eminent creative achievement
   - b. Field of study or career--e.g., any artist, art student, etc.
   - c. Performance on test or work sample

d. Ratings--e.g., by teacher, supervisor

e. Questionnaire--e.g., favorite activities and interests.

II. Index of Title Cross-Referenced by Content Categories

1. Subjects

a. 4, 21, 24, 46, 50, 62, 79, 80, 82, 139, 140, 141, 146

b. 24, 28, 75, 77, 111, 114, 116, 121

c. 2, 5, 14, 22, 25, 26, 27, 28, 29, 35, 39, 40, 44, 45, 55, 67, 72, 75, 95. 97, 98, 104, 107, 108, 112, 113, 117, 118, 119, 120, 124, 142

d. 4, 14, 15, 16, 18, 24, 25, 29, 30, 31, 32, 34, 36, 37, 38, 39, 41, 45, 47, 48, 54, 59, 62, 75, 79, 82, 95, 96, 103, 106, 114, 117, 122, 127, 129, 132, 133, 135, 149

2. Groups Studied or Compared

a. 5, 9, 10, 19, 23, 25, 27, 35, 36, 37, 39, 41, 42, 43, 45, 47, 60, 61, 63, 68, 75, 81, 88, 92, 107, 111, 115, 117, 128, 130, 131.

b. 2, 26, 28, 29, 39, 67, 124

c. 4, 11, 34, 47, 53, 54, 58, 62, 71, 74, 79, 86, 87, 94, 96, 122, 133, 136, 143, 144, 148, 149

d. 7, 8, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 24, 30, 31, 32, 33, 38, 39, 40, 42, 44, 46, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 61, 64, 65, 66, 67, 68, 69, 70, 72, 73, 76, 77, 78, 80, 82, 83, 84, 85, 89, 90, 91, 93, 95, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 108, [illegible], 110, 112, 113, 114, 116, 118, 119, 120, 121, 123, 125, 126, 127, 128, 129, 132, 134, 135, 137, 138, 139, 140, 141, 142, 145, 146, 147

3. Basic Method

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APPENDIX C

ORIGINAL INSTRUMENTS USED IN THIS STUDY

I. Perceptual Memory Test 157

II. Sentence Completion Test (3rd Person Form). 163

III. Color Association Test 167

IV. General Information Questionnaire . . 173

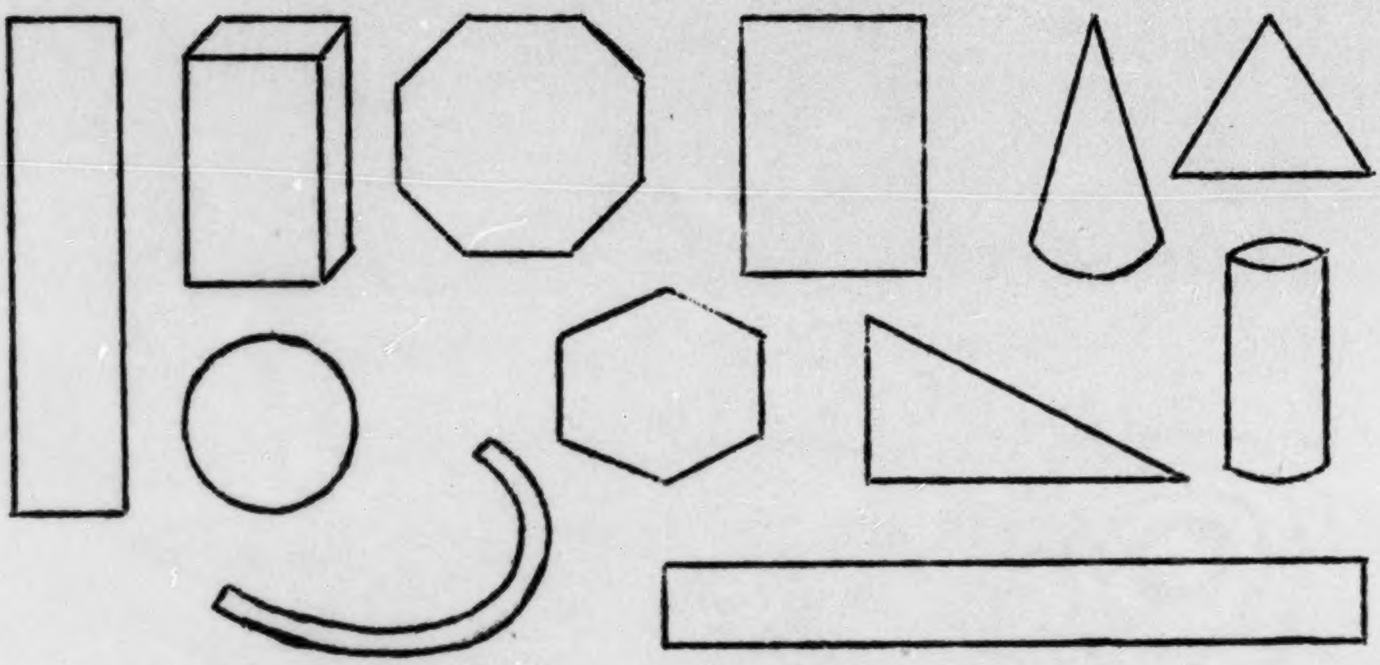
PERCEPTUAL MEMORY TEST

AI - 63

This test is designed to measure memory for visual details. Slides will be projected on the screen for one minute - during this time you should try to memorize as well as possible the figure shown on the screen.

DO NOT OPEN THIS BOOKLET

The picture just projected on the screen was made up of some of the shapes reproduced below. Your task is to reproduce the picture you have seen, as accurately as possible, using only the shapes that were contained in the picture.

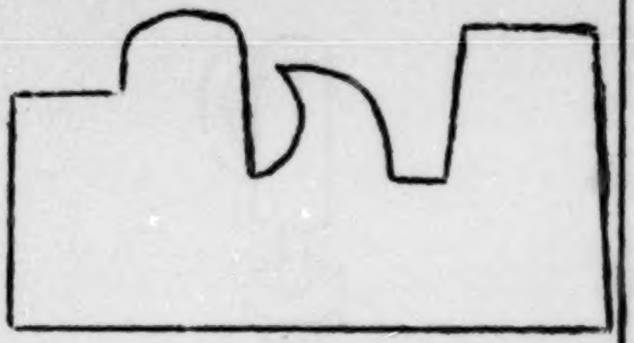


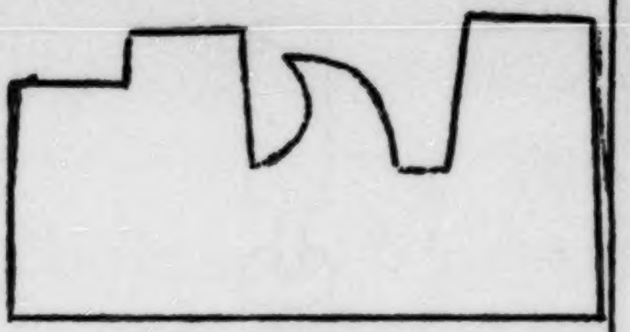
From the shapes above, choose all those that were part of the picture. Mark with an "X" the shapes that you think were used in the picture.

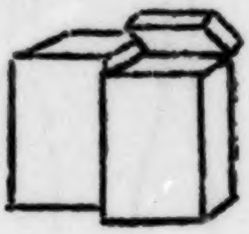
In the space above, reproduce the picture as accurately as possible, using the shapes that you have chosen.

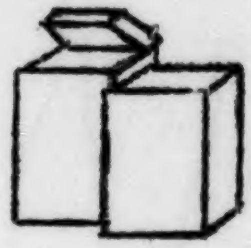
DO NOT TURN THE PAGE

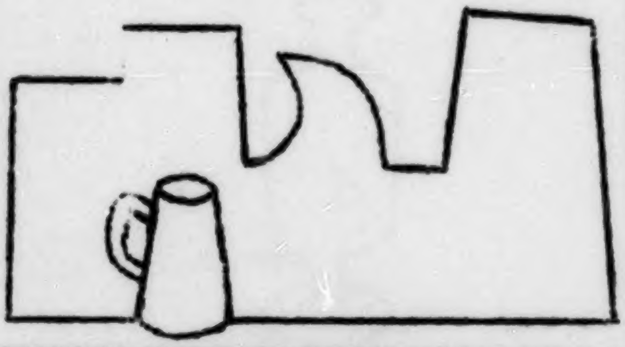
In each pair of figures below, one figure more than the other resembles the picture that has just been projected on the screen.
For each pair, mark with an "X" the figure that in the pair resembles most the picture on the screen.

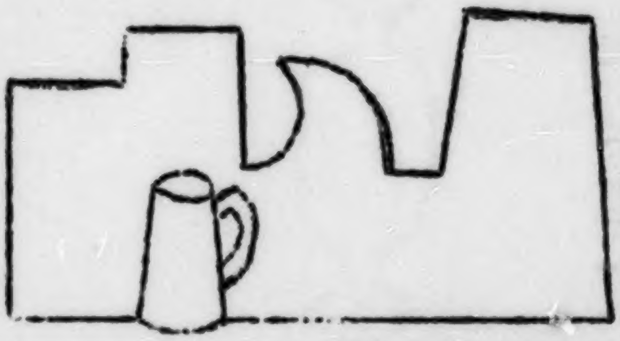


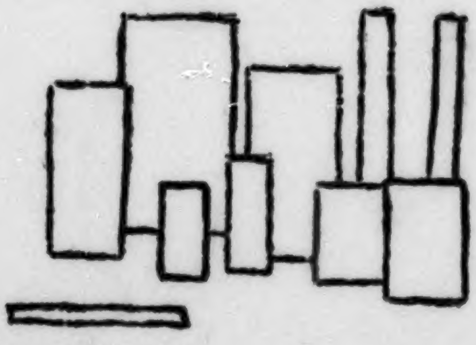


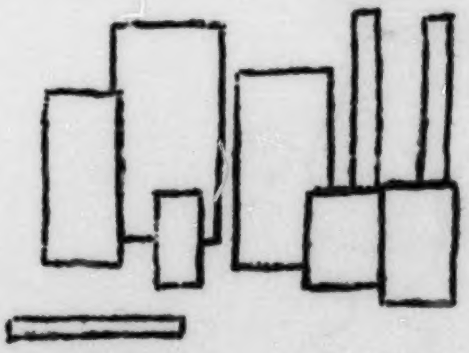


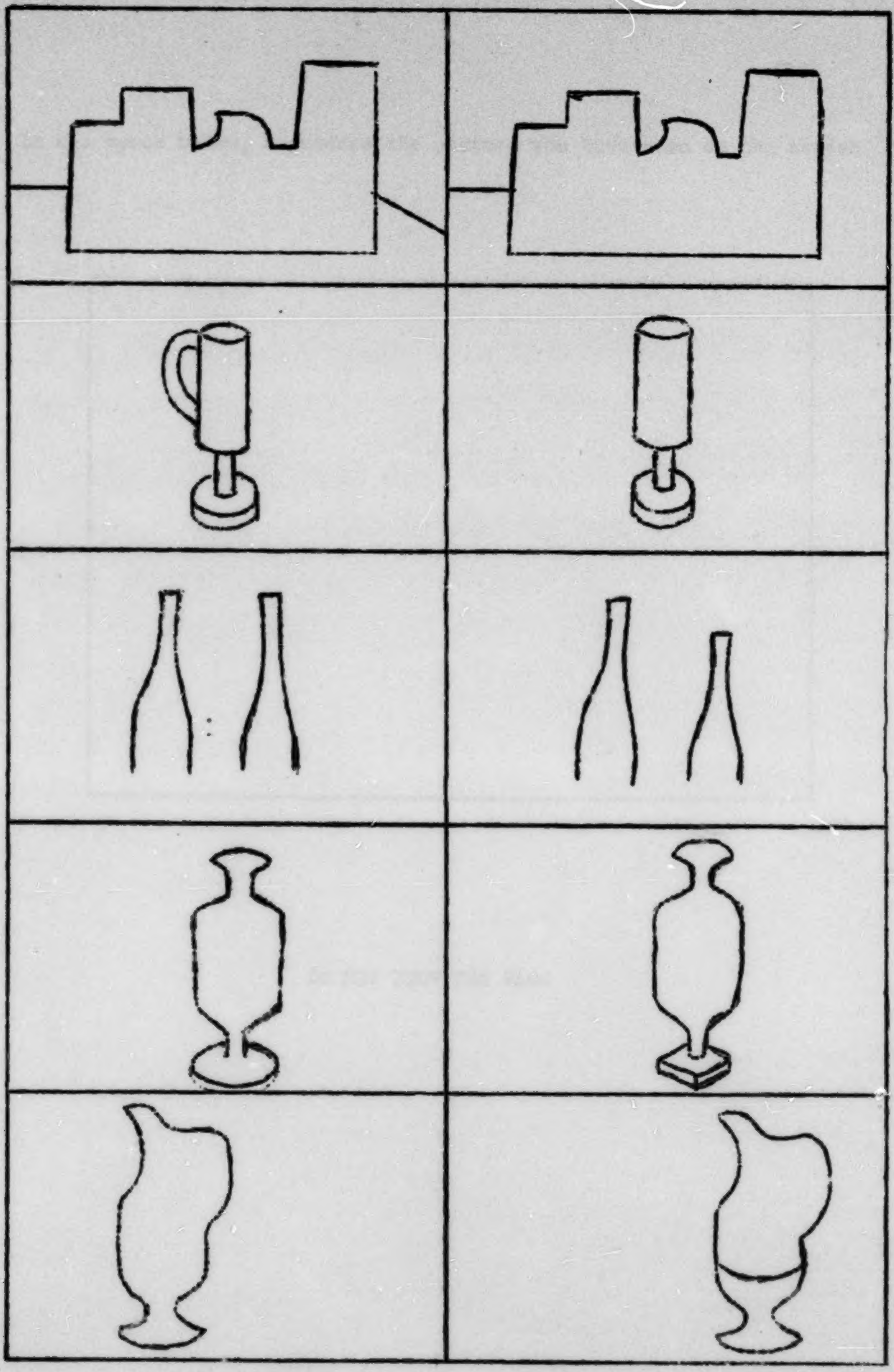












In the space below, reproduce the picture you have seen on the screen.

DO NOT TURN THE PAGE

In the space below, reproduce the picture you have seen on the screen.

The G-C Sentence-Thought Speed Test

Form AI 163 M

Name ______________________ **Class** ____________ **Date** ____________

This booklet contains fifty unfinished sentences. Your task will be to complete each sentence as quickly as possible so that it makes sense. You may use either a word or a phrase, although a phrase is preferable and usually easier. In most cases the best way to answer the test is to put down the first thing that comes to your mind.

EXAMPLE

1. When Joe was going home, he ____________________

This unfinished sentence can be finished by adding "met a friend" or "saw a billboard" or"hurried all the way" or "took a cab" or anything that would make the sentence complete.

Since you will have only a limited time, work quickly. Don't worry about spelling but write legibly. Do not skip any sentences.

____
Time

DO NOT TURN PAGE UNTIL TOLD TO BEGIN

This is a speed test. Work fast. Do not skip any sentences.

1. Pete was happiest when...

2. After Walt finished the work, he thought that it...

3. No matter what others think, Ralph knows himself to be...

4. Working with others all the time made Bill...

5. As a child, Sundays with his parents were for him...

6. When Joe was asked what he thought of his own career, he said...

7. When Bob's emotional feelings become very strong, Bob...

8. Henry feels that his family thinks of him as...

9. When George meets people for the first time, he...

10. When they asked Frank to be in charge, he...

11. Phil believes most people get ahead by...

12. If Larry could start his life over again, he...

13. From past experience, Al thinks most people are...

14. Jerry thought his mother was...

15. When told he would have to do the whole thing by himself, Ed decided...

16. In Dan's opinion, the things that might make a person work hardest are...

This is a speed test. Work fast. Do not skip any sentences.

This is a speed test. Work fast. Do not skip any sentences.

17. Most jobs with responsibility make Dick feel...

18. Fred often thinks of himself as...

19. What Paul dislikes most about his present situation is...

20. John thinks his family is...

21. The thing George is most proud of...

22. If there is one thing about a job that would attract Ken, it is...

23. Al believes most people think of him as...

24. Ten years from now Carl...

25. When they wanted to choose him as their spokesman, Joe...

26. As between mother's and father's ways, Walt usually chose ...

27. Every time Pete had something to say and others were around, he...

28. When Jack finished the test, he thought that he...

29. If there is one thing that might make a person change his career, Jerry thinks it is...

30. When other people avoided him, Rick...

31. Harold often felt as if...

32. When Tom saw that others were doing better than he, he...

33. Fred thinks his parents' opinion of his future is...

34. When Paul had to work next to foreigners, he...

This is a speed test. Work fast. Do not skip any sentences.

This is a speed test. Work fast. Do not skip any sentences.

35. Compared to other things he might be doing, Bill feels his present work is...

36. When Don is working in a very important project and a friend tries to talk to him about his own problems, Don...

37. As between recognition and wealth only during his lifetime, or no recognition during his lifetime but lasting fame after death, Tom would choose...

38. Phil thought his father was...

39. When the only solution seemed to be suicide, Ralph...

40. When he saw his superior coming toward him, Phil...

41. When Henry realized that his work was not turning out as expected, he...

42. When he feels that the odds might be against him, he...

43. When it came to a career his parents felt that he ought to...

44. At the thought of death, Henry...

45. Between the job with great rewards but great possibility of failure, and the job with no possibility of failure but smaller rewards, Al would choose...

46. What Herb dreamt most about was...

47. When he felt the work would require logic and close attention to detail, he...

48. Like most people, Charles knows that deep down he is...

49. As between his mother and his father, Dave felt closer to...

50. Bill's greatest ambition was to become a...

This is a speed test. Work fast. Do not skip any sentences.

University of Chicago

Research

COLOR ASSOCIATION TEST AI 163

Name________________________________ Class________________ Date__________

Please read carefully before you begin to write.

We are asking you to associate some phrases describing abstract concepts, public personalities or personal opinions on the one hand, with six given colors or a color of your own choice on the other. You can do this the following way:

Example

	1	2	3	4	5	6	7
	Red	White	Blue	Black	Yellow	Green	Other (fill in)
1. California					X		
2. I would like my car to be			X				

This would mean that you associate "yellow" with California, and "blue" with your favorite color for a car.

The seventh column (other) is for writing in your own choice of color if you do not like any of the given alternatives.

Please give one, and only one, color for each phrase.

The results of this test depend on your spontaneous reaction, therefore we ask you to work as fast as possible without interfering with a reliable report of your associations.

	Yellow	Black	Green	Red	White	Blue	Other (fill in)
1. I would paint my office							
2. Infancy							
3. Represents best my real personality							
4. My best friend of the same sex							
5. Faith							
6. Eleanor Roosevelt							
7. I like best to have around							
8. Loyalty							
9. I like to stand beside							
10 Elsa Maxwell							

	Yellow	Black	Green	Red	White	Blue	Other (fill in)
11. Childhood							
12. Frank Sinatra							
13. I most prefer to look at							
14. Is most like myself							
15. I would paint my den							
16. Hope							
17. I would like my typewriter to be							
18. Prudence							
19. Henry Ford							
20. My best friend of the opposite sex							

	Yellow	Black	Green	Red	White	Blue	Other (fill in)
21. Singer Ella Fitzgerald							
22. The person I hate most of the same sex							
23. I like flowers which are							
24. Adulthood							
25. Justice							
26. People tend to associate when they think of me							
27. Elizabeth Taylor							
28. I like to see least							
29. Constancy							
30. Mathematics is							

	Yellow	Black	Green	Red	White	Blue	Other (fill in)
31. If I worked, I would want to have around							
32. Is least like myself							
33. Old age							
34. I feel relaxed with							
35. Charity							
36. Is the most beautiful							
37. Financier Bernard Baruch							
38. Innocence							
39. The person of the opposite sex I hate most							
40. Writer, J.D. Salinger							

	Yellow	Black	Green	Red	White	Blue	Other (fill in)
41. Albert Einstein							
42. Work is							
43. Adolescence							
44. Best stands for me							
45. Courtesy							
46. My social self							
47. My secret self							
48. Pablo Picasso							
49. Generosity							
50. Play is							

(Questionnaire)

The University of Chicago
and
The Art Institute of Chicago

RESEARCH STUDY

(The information will be held in strict confidence, and will be seen only by the research personnel.)

(1-5)

Name:__________________________ **Present address**________________
(last) (first)

Family address________________

1. Where were you born? (Please specify city and state)

________________ ________________ **(6)**
(city) (state)

2. Nationality:

	Self	Father	Mother	
U.S.A.	____	____	____	
non-U.S.A.	____	____	____	(7)

3. What is your present age? ________ **(8)**

(9)

4. Please check one: **Male** ________ **1**
Female ________ **2**

5. In what year are you at the Art Institute? **First** ______ **1**
Second ______ **2**
Third ______ **3**
Fourth ______ **4**
Fifth ______ **5**

(10)

6. **Area of Specialization:**

1______ **Advertising, Illustration, Printing design**

2______ **Art Education**

3______ **Ceramics**

4______ **Drawing, Painting and Print Making**

5______ **Dress design**

6______ **Flat pattern and weaving design**

7______ **Industrial design**

8______ **Interior design**

9______ **Sculpture and Architectural design**

(11)

7. **Marital status: (Please check one)** (12)

Single . . . . ______ 1

Married. . . . . ______ 2

Separated . . . . ______ 3

Divorced. . . . . ______ 4

Widowed. . . . . ______ 5

Remarried (following divorce) . . ______ 6

Remarried (following spouse's death)______ 7

(13)

8. **Education: (Please check highest level attained)**

Less than high school . . . . ______ 1

Some high school . . . . ______ 2

Completed high school . . . . ______ 3

Some college (other than the Art Institute). ______ 4

Completed college (" " "). ______ 5

Postgraduate study(" " "). ______ 6

9. **Father's occupation: (Please check one)** **(14)**

(If deceased, please indicate occupation at time of death)

Worker (unskilled or semi-skilled, "blue collar"). . . . ____ 1

Worker (skilled or mechanic, "blue collar"). . . . . . ____ 2

Farmer. ____ 3

Worker (clerical, retail clerk, foreman, "white collar") ____ 4

Junior Executive . . . . ____ 5

Major Executive. . . . . ____ 6

Owner of small business (sales under $100,000) . . . . ____ 7

(Please specify ____________________)

Owner of large business sales over $100,000). . . . . . ____ 8

(Please specify ____________________)

Professions (Lawyer, M.D., Professor, Teacher, etc.). . ____ 9

(Please specify ____________________)

Other (Please specify ____________________). . . . ____ 0

(15)

10. **Mother's occupation (Please check one)**

(If deceased, please indicate occupation at time of death) **(16)**

Worker(unskilled or semi-skilled, "blue collar"). . . ____ 1

Worker (skilled or mechanic, "blue collar"). . . . . . ____ 2

Housewife . . . . ____ 3

Worker (clerical, retail clerk, "white collar"). . . . ____ 4

Junior Executive . . . . ____ 5

Major Executive . . . . ____ 6

Owner of small business (sales under $100,000). . . . ____ 7

(Please specify ____________________)

Owner of large business (sales over $100,000). . . . . ____ 8

(Please specify ____________________)

Professions (Lawyer, M.D., Professor, Teacher, etc.) . . ____ 9

(Please specify: ____________________)

Other (Please specify ____________________________) ____ 0

(17)

11. Estimate your parents' yearly income: (Please check one) (18)

Less than $5,000 . . . . ______ 1

Between $5,000 and $7,500 . . . . ______ 2

Between $7,500 and $10,000. . . . . ______ 3

Between $10,000 and $15,000 . . . . ______ 4

Over $15,000 . . . . ______ 5

12. Father's education: (Please check highest level attained) (19)

Less than high school . . . . ______ 1

Some high school . . . . ______ 2

Completed high school . . . . ______ 3

Some college . . . . ______ 4

Completed college . . . . ______ 5

Postgraduate study . . . . ______ 6

13. Mother's education: (Please check highest level attained) (20)

Less than high school. . . . . ______ 1

Some high school . . . . ______ 2

Completed high school . . . . ______ 3

Some college . . . . ______ 4

Completed college. . . . . ______ 5

Postgraduate study. . . . . ______ 6

14. Marital status of parents: (Please check all those that apply) (21)

Are your parents:

living together . . . . ______ 1

separated . . . . ______ 2

divorced. . . . . ______ 3

Is your father:

widowed. . . . . ______ 4

remarried . . . . ______ 5

Is your mother:

widowed. . . . . ______ 6

remarried . . . . ______ 7

15. If your father is deceased, how old were you at the time of his death? (22)

under 5 . . . . ______ 1

between 6 - 10 . . . . ______ 2

between 11 - 15. . . . . ______ 3

between 16 - 20. . . . . ______ 4

Over 20 . . . . ______ 5

16. If your mother is deceased, how old were you at the time of her death? (23)

under 5 . . . . ______ 1

between 6 - 10 . . . . ______ 2

between 11 - 15. . . . . ______ 3

between 16 - 20. . . . . ______ 4

Over 20 . . . . ______ 5

17. **How many brothers and sisters do you have? __________ (24)**

In the row of numbers below, please circle the number which
indicates your position among your brothers and sisters. (For (25)
example, if you are an only child or the oldest child you (26)
circle 1, if you have two older sibs you circle 3, if you have (27)
four older sibs you circle 5, etc.) Then mark with a "B"
(Brother) or an "S" (Sister) the numbers corresponding to the
positions of your other sibs, if any.

1 2 3 4 5 6 7 8 9 10

18. **Religion: (Please check one) (28)**

Protestant. . . . . _______ 1
Catholic. . . . . _______ 2
Jewish . . . . _______ 3
Other (Please specify_______________).. _______ 4
None . . . . _______ 5

19. **Do you attend a place of worship at least once a month? (29)**

Yes _______ 1
No _______ 2

20. **Does your father belong to the same religion? (30)**

Yes _______ 1
No _______ 2

21. **Does your mother belong to the same religion?**

Yes _______ 1
No _______ 2

22. **Sources of support: (Please check all those that apply)** (31)

Family Support . . . . ______ 1
G.I. Bill. . . . . ______ 2
Scholarship . . . . ______ 3
Working Agreement . . . . ______ 4
Salary or wages. . . . . ______ 5
Loans . . . . ______ 6
Gifts. . . . . ______ 7
Private income (other than salary) . . . . ______ 8
Other (Please specify________________) . ______ 9

23. **How many years ago did you begin seriously to consider a career in the arts?** (32)

I am still uncommitted . . . . ______ 0
When I was less than 8 years old. . . . ______ 1
When I was 8 - 9 years old . . . . . . ______ 2
" " 10 - 11 " " . . . . ______ 3
" " 12 - 13 " " . . . . ______ 4
" " 14 - 15 " " . . . . ______ 5
" " 16 - 17 " " . . . . ______ 6
" " 18 - 19 " " . . . . ______ 7
" " 20 - 21 " " . . . . ______ 8
When I was more than 21 years old . . . . ______ 9

(33)

24. When did you begin to do art work in excess of your school assignments as part of your regular activities? (Check the lowest age that applies)

Before grade 2 in Grammar School . . . . ______ 1
Before grade 4 in Grammar School . . . . ______ 2
Before grade 6 in Grammar School . . . . ______ 3
Before grade 8 in Grammar School . . . . ______ 4
Before Sophomore class in High School . . . . . . ______ 5
Before graduating from High School . . . . . . ______ 6
After High School . . . . ______ 7
Never did art work except as school assignment. . ______ 0

25. Did you ever exhibit your work, outside regular class assignments? (34)
If yes, please specify, describing work and giving circumstance and date. (35)

Yes ______
No ______

26. Did you ever win any prizes or scholarships, in school or outside (36)
for your artwork? If yes, please specify, describing work and giving circumstance and time. (37)

Yes ______
No ______

27. What do you plan to do after completing your work at the Art (38)
Institute? (Please indicate specifically your goals - educational, professional, etc.) (39)

1 (78)
6 (79)
3 (80)

APPENDIX D

DATA

Section

D.01 Means, Standard Deviations and Standard Errors of the Mean for All Variables, for Total Sample of Art Students

D.02 Means, Standard Deviations and Standard Errors of the Mean for All Variables, for Core Sample of Art Students

D.03A Means, Standard Deviations and Standard Errors of the Mean for Core Male Art Students (N=86)

D.03B Correlation Matrix for Core Male Art Students (N=86)

D.04A Means, Standard Deviations and Standard Errors of the Mean for Core Female Art Students (N=93)

D.04B Correlation Matrix for Core Female Art Students (N=93)

D.05 Degrees of Freedom, Sums of Squares, Mean Squares and F Values--Effects of Sex, Major, and Interaction

D.06 Image Covariance Factor Analysis. Core Sample (N=179). Rotated Factor Matrix

D.07 Image Covariance Factor Analysis. Core Male Art Students (N=86). Rotated Factor Matrix.

D. 08 Image Covariance Factor Analysis. Core Female Art Students (N=93). Rotated Factor Matrix.

APPENDIX D.01

MEANS, STANDARD DEVIATIONS AND STANDARD ERRORS OF THE MEAN FOR ALL VARIABLES, FOR TOTAL SAMPLE OF ART STUDENTS

Variablo	No.	Mean	S.D.	S.E. of Mean	N
Rating OAP-1..	1	5.13	1.03	.062	281
Rating OAP-2	2	5.45	1.21	.072	281
Art Grades	3	7.63	1.61	.097	273
Academic Grades	4	6.12	2.42	.150	261
Unusual Uses	5	14.57	5.19	.318	266
Brick Fluency	6	15.94	6.17	.378	266
Brick Flexibility	7	10.27	4.44	.272	266
Ideational Fluency	8	14.44	4.68	.325	207
TAT Novelty	9	3.62	2.98	.206	209
Object-Question	10	8.14	4.86	.338	207
Word Association Fluency . .	11	55.13	15.50	1.067	211
Word Association Flexibility	12	45.11	12.37	.854	210
Wonderlic I.Q.	13	22.13	5.23	.360	210
16 PF B, I.Q.	14	8.06	2.06	.144	205
Spatial Visualisation	15	15.74	7.34	.452	263
Hidden Shapes	16	21.25	6.35	.395	259
Match Problems	17	5.76	2.77	.194	204
Perceptual Memory	18	20.61	12.44	.859	210
Welsh Art Judgment	19	34.85	10.65	.735	210
Theoretical Value	20	43.41	6.62	.408	263
Economic Value	21	34.59	7.79	.480	263
Aesthetic Value	22	53.56	8.11	.500	263
Social Value	23	32.72	6.87	.424	263
Political Value	24	38.06	6.17	.381	263
Religious Value	25	37.61	8.78	.543	263
16 A. Cyclothymia	26	8.31	3.19	.222	205
16 C. Ego-strength	27	14.03	3.86	.270	205
16 E. Dominance	28	13.52	3.64	.254	205
16 F. Surgency	29	12.97	4.15	.290	205
16 G. Superego	30	10.40	3.29	.230	205
16 H. Parmia	31	11.88	4.98	.348	205
16 I. Premsia	32	11.00	3.20	.224	205
16 L. Protension	33	9.78	2.93	.204	205
16 M. Autia	34	15.05	3.44	.240	205
16 N. Shrewdness	35	9.90	2.60	.182	205
16 O. Guilt	36	11.36	3.71	.259	205
16 Q_1.Radical	37	10.35	2.88	.201	205
16 Q_2.Self-Sufficiency . . .	38	13.42	3.13	.218	205
16 Q_3.Self-Sentiment	39	9.54	2.85	.199	205
16 Q_4.Id Tension	40	13.93	4.79	.335	205
Sent. Comp. 3-1	41	52.78	4.92	.353	194
Ego Identity	42	4.76	.99	.068	208

APPENDIX D.02

MEANS, STANDARD DEVIATIONS AND STANDARD ERRORS OF THE MEAN FOR ALL VARIABLES, FOR CORE SAMPLE OF ART STUDENTS (N = 179)

Variable	No.	Mean	S.D.	S.E. of Mean
Rating OAP-1	1	5.11	.96	.721
Rating OAP-2	2	5.47	1.25	.932
Art Grades	3	7.62	1.49	.111
Academic Grades	4	6.15	2.35	.176
Unusual Uses	5	14.55	4.79	.356
Brick Fluency	6	15.97	5.95	.444
Brick Flexibility	7	10.27	4.25	.318
Ideational Fluency	8	14.36	4.65	.347
TAT Novelty	9	3.70	3.05	.228
Object Question	10	7.98	4.89	.366
Word Association Fluency	11	55.08	15.28	1.142
Word Association Flexibility	12	45.12	12.52	.936
Wonderlic I.Q.	13	22.02	5.20	.388
16 PF B, I.Q.	14	8.12	2.07	.155
Spatial Visualization	15	15.54	6.73	.503
Hidden Shapes	16	20.87	5.62	.420
Match Problems	17	6.48	6.87	.513
Perceptual Memory	18	20.13	11.32	.846
Welsh Art Judgment	19	34.70	10.79	.806
Theoretical Value	20	43.09	6.79	.507
Economic Value	21	34.62	7.60	.568
Aesthetic Value	22	53.77	7.67	.573
Social Value	23	32.85	6.98	.522
Political Value	24	38.01	5.98	.433
Religious Value	25	37.70	8.65	.647
16 A. Cyclothymia	26	8.27	3.11	.232
16 C. Ego-strength	27	14.07	3.80	.290
16 E. Dominance	28	13.41	3.64	.272
16 F. Surgency	29	12.83	4.16	.311
16 G. Superego	30	10.53	3.19	.238
16 H. Parmia	31	11.68	5.06	.378
16 I. Premsia	32	11.00	3.26	.244
16 L. Protension	33	9.74	2.91	.217
16 M. Autia	34	15.06	3.21	.240
16 N. Shrewdness	35	9.99	2.65	.198
16 O. Guilt	36	11.36	3.76	.281
16 Q_1. Radicalism	37	10.54	2.87	.215
16 Q_2. Self-Sufficiency	38	13.42	3.10	.232
16 Q_3. Self-Sentiment	39	9.62	2.84	.212
16 Q_4. Id Tension	40	14.00	4.69	.350
Sent. Comp. 3-1	41	53.00	4.71	.352
Ego Identity	42	4.77	.95	.710

APPENDIX D.03.A
Means, SD, S.E.of Mean
Core Male Art Students (N.=86)

MEANS A

VARIABLE NO.	MEAN	S.D.	S.E. OF MEAN
1	52.1046510	9.50916350	1.02539946
2	54.4418602	12.0758414	1.30217147
3	75.3372087	14.2156569	1.53291370
4	57.7674417	22.5193615	2.42832521
5	14.7325581	5.50812054	0.59395590
6	15.8720930	6.40734172	0.69092143
7	9.81395340	4.21345568	0.45434861
8	14.6860465	4.76324522	0.51363394
9	4.01162785	3.46917206	0.37409044
10	7.38372087	5.06236005	0.54588832
11	53.6627903	15.7611647	1.69957009
12	44.3255811	12.1987853	1.31542885
13	21.9186046	5.25405145	0.56655893
14	8.11627901	2.00832719	0.21656349
15	18.1860464	6.49073774	0.69991425
16	21.1744184	5.85549802	0.63141458
17	6.73255813	7.01833552	0.75680658
18	20.4418604	11.8028940	1.27273878
19	34.4186044	12.0581567	1.30026448
20	43.9883718	6.94599962	0.74900640
21	35.8255811	8.55596268	0.92261318
22	52.9883718	7.58402914	0.81780689
23	31.8837209	6.38825810	0.68886358
24	38.5697670	5.53818899	0.59719828
25	36.8488369	9.46139729	1.02024871
26	7.53488368	3.24924451	0.35037504
27	14.0348836	4.35875720	0.47001687
28	14.0348836	3.39704913	0.36631323
29	12.6279069	4.19256002	0.45209537
30	11.3604650	3.21362060	0.34653362
31	11.1511627	5.31925952	0.57359050
32	9.97674417	3.51794276	0.37934952
33	10.1162790	3.15638849	0.34036212
34	14.5232557	3.19457868	0.34448028
35	10.4651163	2.42873785	0.26189753
36	11.3837209	4.06467831	0.43830553
37	10.4883721	2.81902829	0.30398364
38	13.4651163	3.17600405	0.34247732
39	9.83720922	2.98569289	0.32195554
40	14.1046511	4.77500558	0.51490209
41	53.5930228	7.00483400	0.75535067
42	47.4534883	8.93329012	0.96330145

APPENDIX D.03.B
Correlation Matrix
Core Male Art Students (N.=86)

CORRELATION MATRIX D.03.B PMN UNIFIED

	1	2	3	4	5	6	7	8	9	10
1	1.0000	0.3349	0.3501	0.0803	-0.0314	-0.0455	-0.0253	0.0207	0.1818	-0.0492
2	0.3349	1.0000	0.1787	0.0538	0.0200	0.0600	0.1186	-0.0047	0.0678	0.0615
3	0.3501	0.1787	1.0000	0.3528	0.0440	0.0428	0.0146	0.1032	0.1743	0.0987
4	0.0803	0.0538	0.3528	1.0000	0.1725	0.2281	0.2888	0.2145	0.0910	0.1591
5	-0.0314	0.0200	0.0440	0.1725	1.0000	0.4464	0.5453	0.3770	0.0217	0.2392
6	-0.0455	0.0600	0.0428	0.2281	0.4464	1.0000	0.6362	0.4848	0.1959	0.2598
7	-0.0253	0.1186	0.0146	0.2888	0.5453	0.6362	1.0000	0.4127	0.0629	0.3018
8	0.0207	-0.0047	0.1032	0.2145	0.3770	0.4848	0.4127	1.0000	0.1220	0.1139
9	0.1818	0.0678	0.1743	0.0910	0.0217	0.1959	0.0629	0.1220	1.0000	0.2329
10	-0.0492	0.0615	0.0987	0.1591	0.2392	0.2598	0.3018	0.1139	0.2329	1.0000
11	-0.0476	0.0693	-0.0365	0.4076	0.2871	0.4249	0.3750	0.2380	0.1113	0.2411
12	-0.0799	0.1399	-0.0925	0.3588	0.3597	0.2421	0.3290	0.2551	0.1389	0.1841
13	0.0254	0.1632	0.0514	0.4016	0.2253	0.2373	0.2868	0.3417	0.1698	0.1715
14	0.1447	0.1419	0.1457	0.2045	0.2049	-0.1506	-0.0016	0.1232	-0.0897	0.0164
15	-0.0390	0.0998	-0.2041	0.0863	0.1521	-0.0967	-0.0409	0.0392	-0.0445	0.0537
16	0.0565	0.1713	0.0174	0.0574	0.2517	0.2881	0.1434	0.1821	0.0856	0.1918
17	-0.0928	-0.1820	-0.1845	-0.0323	-0.0192	-0.0863	-0.0077	0.0056	-0.0492	0.0725
18	-0.0872	-0.0683	0.0260	-0.0413	0.0017	-0.1127	-0.0913	-0.0425	0.1481	-0.1476
19	-0.0999	-0.1125	0.0393	0.0943	-0.0904	-0.1062	-0.0675	-0.0485	-0.2358	-0.0578
20	0.2727	0.0468	0.3497*	0.0648	0.2069	-0.1346	-0.0226	-0.0926	-0.0127	-0.0156
21	-0.3177*	-0.2281	-0.4040**	-0.2386	-0.0861	-0.0221	-0.0802	0.0108	-0.0415	-0.1543
22	0.0893	0.2640	0.2008	0.2097	0.0686	0.0307	0.1321	-0.0060	0.0657	0.3249
23	-0.0637	-0.0812	-0.1199	-0.0275	-0.0223	0.0726	0.0258	0.0626	-0.0732	-0.1448
24	-0.0807	-0.1773	-0.0694	-0.0578	0.0895	0.1035	0.0898	0.1826	0.2342	0.1243
25	-0.0739	0.1352	0.0455	0.0195	-0.2051	-0.0442	-0.1134	-0.1211	-0.1275	-0.1184
26	-0.2341	-0.0151	-0.2941	-0.2174	-0.0977	0.0836	-0.0004	0.0239	-0.0214	-0.2007
27	-0.3299*	-0.1467	-0.2444	-0.0950	0.0729	0.0916	0.1579	-0.0108	-0.1307	-0.0459
28	-0.1152	-0.0749	-0.1518	-0.0193	-0.1014	-0.0084	0.0506	-0.1658	0.1118	0.0717
29	-0.2758	-0.1912	-0.2628	-0.0676	-0.0049	0.1467	0.1126	-0.0330	0.0909	0.0473
30	-0.1333	-0.1391	-0.1513	-0.0928	-0.0158	-0.1880	-0.1618	0.0044	-0.1861	-0.1597
31	-0.3365*	-0.1655	-0.1465	-0.1711	0.0817	0.1638	0.0727	-0.1750	-0.0192	-0.0795
32	0.1605	0.3270*	0.2458	0.1420	-0.0768	0.0729	0.0997	-0.0405	-0.0491	0.0776
33	0.0596	0.1796	0.0072	0.1874	0.0201	-0.0551	0.1812	0.1308	0.0203	-0.0882
34	0.0264	0.2632	0.1479	0.3296	0.1478	0.1746	0.2048	-0.0007	0.1640	0.2282
35	-0.1050	-0.1487	0.0339	0.0588	0.0446	-0.1020	0.0269	0.0768	-0.0607	-0.0271
36	-0.0267	0.0833	-0.0513	-0.0207	-0.0111	0.0182	-0.0762	0.0336	-0.0120	-0.0261
37	0.0885	-0.0116	0.1641	0.1703	0.0714	-0.0831	-0.0289	0.0484	-0.0439	0.0147
38	0.2753	0.1808	0.1494	0.1024	-0.1764	-0.2341	-0.1561	-0.1847	-0.0507	-0.0016
39	-0.2663	-0.1288	-0.0672	-0.0350	0.0495	-0.1346	-0.0511	-0.0260	-0.3031	-0.1001
40	0.1337	0.1730	-0.0004	-0.1717	0.0847	0.0520	0.0168	0.0682	0.0702	0.0766
41	-0.0085	0.0486	0.0971	0.0688	0.0752	0.0594	0.0118	0.0465	0.0191	0.0625
42	-0.1105	0.0268	-0.0003	0.0642	0.0372	0.0670	0.1173	-0.0118	0.0784	-0.0317

MALE ART GETZELS CORRELATION MATRIX D.C3.B(2) PMN UNIFIED

	11	12	13	14	15	16	17	18	19	20
1	-0.0476	-0.0799	0.0254	0.1447	-0.0390	0.0565	-0.0928	-0.0872	-0.0999	0.2727
2	0.0693	0.1399	0.1632	0.1419	0.0998	0.1713	-0.1820	-0.0683	-0.1125	0.0468
3	-0.0365	-0.0925	0.0514	0.1457	-0.2041	0.0174	-0.1845	0.0260	0.0393	0.3497
4	0.4076	0.3588	0.4016	0.2045	0.0863	0.0574	-0.0323	-0.0413	0.0943	0.0648
5	0.2871	0.3597	0.2253	0.2049	0.1521	0.2517	-0.0192	0.0017	-0.0904	0.2069
6	0.4249	0.2421	0.2373	-0.1506	-0.0987	0.2881	-0.0863	-0.1127	-0.1062	-0.1346
7	0.3750	0.3290	0.2868	-0.0016	-0.0409	0.1434	-0.0077	-0.0913	-0.0675	-0.0226
8	0.2380	0.2551	0.3417	0.1232	0.0392	0.1821	0.0056	-0.0425	-0.0485	-0.0926
9	0.1113	0.1389	0.1698	-0.0897	-0.0445	0.0856	-0.0492	0.1481	-0.2358	-0.0127
10	0.2411	0.1841	0.1715	0.0164	0.0537	0.1918	0.0725	-0.1476	-0.0578	-0.0156
11	1.0000	0.7704	0.4122	0.1146	0.2215	0.2620	0.2111	0.0666	-0.0883	-0.0393
12	0.7704	1.0000	0.5386	0.2726	0.4332	0.2535	0.0247	-0.0882	-0.1292	0.0000
13	0.4122	0.5386	1.0000	0.3231	0.4907	0.3737	0.0533	-0.2627	-0.1404	-0.1012
14	0.1146	0.2726	0.3231	1.0000	0.3286	0.2934	0.0056	-0.2598	-0.0292	0.1055
15	0.2215	0.4332	0.4907	0.3286	1.0000	0.3768	0.0892	-0.2357	-0.1076	0.0700
16	0.2620	0.2535	0.3737	0.2934	0.3768	1.0000	0.0845	-0.2730	-0.0895	-0.0017
17	0.2111	0.0247	0.0533	0.0056	0.0892	0.0845	1.0000	0.1334	-0.0240	-0.0020
18	0.0666	-0.0882	-0.2627	-0.2598	-0.2357	-0.2730	0.1334	1.0000	-0.0043	-0.0362
19	-0.0883	-0.1292	-0.1404	-0.0292	-0.1076	-0.0895	-0.0240	-0.0043	1.0000	0.1185
20	-0.0393	0.0000	-0.1012	0.1055	0.0700	-0.0017	-0.0020	-0.0362	0.1185	1.0000
21	-0.0382	0.0126	0.0711	-0.1665	0.0894	-0.0217	0.0572	0.0294	-0.0688	-0.2978
22	0.0253	0.1445	0.0729	0.1414	-0.0339	-0.0773	0.0327	-0.1377	-0.1058	0.1512
23	0.1002	-0.1062	-0.1072	-0.1823	-0.1958	-0.0337	-0.0624	0.1385	0.0379	-0.2267
24	-0.0425	-0.0216	0.0667	-0.0356	0.1679	0.0451	0.0551	0.0231	-0.1854	-0.1775
25	0.0311	-0.0199	0.0286	0.1087	0.0190	0.1039	-0.0240	-0.0317	0.1484	-0.2927
26	-0.0594	0.0430	-0.0546	-0.0096	0.0209	0.0649	0.0378	-0.0615	0.0768	-0.3443
27	0.1055	0.2237	0.1255	0.0519	0.1291	0.1132	-0.0308	0.0024	0.0834	-0.0556
28	0.1571	0.3413	0.3119	0.0839	0.2980	0.0458	0.0256	-0.1175	-0.0538	0.0045
29	0.0967	0.2430	0.1166	-0.0465	0.1937	0.1555	-0.0234	-0.2168	0.0390	-0.1856
30	-0.0426	-0.0240	-0.0387	0.1374	-0.0574	0.1023	-0.0191	0.0457	0.1676	-0.1795
31	0.1574	0.1867	0.0501	-0.1217	0.1270	0.0698	-0.0455	-0.0594	0.0298	-0.1397
32	0.1146	0.0520	0.0623	0.0970	-0.0513	-0.0803	0.0255	0.0037	-0.0916	0.0448
33	0.1188	0.1374	0.0786	0.1055	-0.0062	-0.1373	-0.1059	-0.1599	0.1344	0.0848
34	0.3010	0.2969	0.0853	-0.0536	0.0100	-0.0678	0.0352	0.0509	0.0388	0.1355
35	-0.0032	-0.0377	0.0639	-0.0209	-0.0250	-0.0074	0.1316	0.0124	0.1443	-0.2068
36	-0.0084	-0.0365	-0.0002	-0.0617	-0.0736	-0.0780	-0.0430	-0.0369	-0.0535	-0.1865
37	0.1700	0.2362	-0.0505	0.3140	0.1454	-0.0166	0.0120	0.1600	-0.0777	0.3668
38	0.0894	0.1172	-0.1161	0.1279	-0.0545	-0.1999	-0.1485	-0.0015	0.0812	0.3069
39	-0.2102	-0.1607	-0.0751	-0.0223	-0.1259	0.0481	-0.0695	0.0985	0.2398	-0.0806
40	-0.1036	-0.0614	0.0402	0.0171	-0.0367	-0.1063	-0.0065	-0.1632	-0.1973	0.0298
41	0.1258	0.0974	0.1254	0.0703	0.1388	0.1997	0.1567	0.0013	0.0617	0.1689
42	0.0933	0.1618	0.0369	-0.0692	-0.0784	0.0246	-0.0495	-0.0025	0.0262	-0.1470

D.03.B (3)

	21	22	23	24	25	26	27	28	29	30
1	-0.3177	0.0893	-0.0637	-0.0807	0.0739	-0.2349	-0.3299	-0.1152	-0.2758	-0.1333
2	-0.2281	[illegible]	-0.0812	-0.1773	0.1352	-0.0151	-0.1467	-0.0749	-0.1912	-0.1391
3	-0.4040	0.2008	-0.1199	-0.0694	0.0455	-0.2941	-0.2444	-0.1518	-0.2628	-0.1513
4	-0.2386	0.2097	-0.0275	-0.0578	0.0195	-0.2174	-0.0950	-0.0193	-0.0676	-0.0928
5	-0.0861	0.0686	-0.0223	0.0895	-0.2051	-0.0977	0.0729	-0.1014	-0.0049	-0.0159
6	-0.0221	0.0307	0.0726	0.1035	-0.0442	0.0836	0.0916	-0.0084	0.1467	-0.1880
7	-0.0802	0.1321	0.0258	0.0898	-0.1134	-0.0004	0.1579	0.0506	0.1126	-0.1618
8	0.0108	-0.0060	0.0626	0.1826	-0.1211	0.0239	-0.0108	-0.1658	-0.0330	0.0044
9	-0.0415	0.0657	-0.0732	0.2342	-0.1275	-0.0214	-0.1307	0.1118	0.0909	-0.1861
10	-0.1543	0.3249	-0.1448	0.1243	-0.1184	-0.2007	-0.0459	0.0717	0.0473	-0.1597
11	-0.0382	0.0253	0.1002	-0.0425	0.0311	-0.0594	0.1055	0.1571	0.0967	-0.0426
12	0.0126	0.1445	-0.1062	-0.0216	-0.0199	0.0430	0.2237	0.3413	0.2430	-0.0240
13	0.0711	0.0729	-0.1072	0.0667	0.0286	-0.0546	0.1255	0.3119	0.1166	-0.0387
14	-0.1665	0.1414	-0.1823	-0.0356	0.1087	-0.0096	0.0519	0.0839	-0.0465	0.1374
15	0.0894	-0.0339	-0.1956	0.1679	0.0190	0.0209	0.1291	0.2980	0.1937	-0.0574
16	-0.0217	-0.0773	-0.0337	0.0451	0.1039	0.0649	0.1132	0.0458	0.1555	0.1023
17	0.0572	0.0327	-0.0624	0.0551	-0.0240	0.0378	-0.0308	0.0256	-0.0234	-0.0191
18	0.0294	-0.1377	0.1385	0.0231	-0.0317	-0.0615	0.0024	-0.1175	-0.2168	0.0457
19	-0.0686	-0.1058	0.0379	-0.1854	0.1484	0.0768	0.0834	-0.0538	0.0390	0.1676
20	-0.2978	0.1512	-0.2267	-0.1775	-0.2927	-0.3443	-0.0556	0.0045	-0.1856	-0.1795
21	1.0000	-0.4424	0.0246	0.2320	-0.3908	0.1621	0.2122	0.0731	0.1566	0.1076
22	-0.4424	1.0000	-0.2851	-0.2021	-0.2379	-0.2628	-0.1306	0.0539	-0.1208	-0.2364
23	0.0246	-0.2851	1.0000	-0.2601	-0.0861	0.0376	-0.0096	-0.2291	0.0133	0.1344
24	0.2320	-0.2021	-0.2601	1.0000	-0.3205	0.0940	0.0523	0.0996	0.1283	-0.1538
25	-0.3908	-0.2379	-0.0861	-0.3205	1.0000	0.2637	-0.0549	0.0038	-0.0023	0.2320
26	0.1621	-0.2628	0.0376	0.0940	0.2637	1.0000	0.1274	0.2274	0.3913	0.2945
27	0.2122	-0.1306	-0.0096	0.0523	-0.0549	0.1274	1.0000	0.2915	0.1958	0.1788
28	0.0731	0.0539	-0.2291	0.0996	0.0038	0.2274	0.2915	1.0000	0.4148	-0.2620
29	0.1566	-0.1208	0.0133	0.1283	-0.0023	0.3913	0.1958	0.4148	1.0000	-0.0091
30	0.1076	-0.2364	0.1344	-0.1538	0.2320	0.2945	0.1788	-0.2620	-0.0091	1.0000
31	0.2048	-0.1755	0.0538	0.0274	0.0374	0.4391	0.3905	0.4841	0.5100	0.1083
32	-0.4477	0.4621	-0.0106	-0.2958	0.2173	-0.1306	-0.3383	-0.0344	-0.2742	-0.1283
33	-0.1247	0.1917	-0.0635	-0.0368	-0.0187	-0.0233	-0.2774	-0.0904	-0.0580	-0.0216
34	-0.3991	0.4217	-0.0592	-0.1175	0.0170	-0.1554	-0.1821	0.0829	-0.0433	-0.2856
35	0.2955	-0.2501	-0.0124	0.0500	0.0548	0.1828	0.2574	-0.0234	0.0045	0.2345
36	-0.0430	0.1433	-0.1047	0.0006	0.1499	0.0297	-0.4842	-0.2430	-0.0778	0.0947
37	-0.1228	0.0597	-0.1111	-0.0745	-0.0982	-0.1444	0.1068	0.0449	-0.1079	-0.0742
38	-0.2503	0.1761	-0.0965	-0.3450	0.1196	-0.3368	0.0464	0.0585	-0.4428	-0.1884
39	0.2176	-0.1697	0.0847	-0.0157	-0.0400	0.0964	0.3539	-0.2453	-0.1402	0.4856
40	-0.1395	0.2966	-0.1118	-0.0655	-0.0327	-0.0423	-0.5496	-0.0430	-0.0615	-0.2363
41	-0.1125	0.0526	-0.0847	0.1158	-0.0407	-0.0343	-0.0180	0.0021	-0.1719	0.0170
42	0.1697	-0.1979	0.1026	0.0263	0.0587	0.1375	0.4796	0.0646	0.1343	0.2365

D.03.B (4)

	31	32	33	34	35	36	37	38	39	40
1	-0.3385	0.1805	0.0596	0.0264	-0.1050	-0.0269	0.0885	0.2753	-0.2663	0.1337
2	-0.1855	0.3270	0.1798	0.2632	-0.1487	0.0833	-0.0116	0.1808	-0.1288	0.1730
3	-0.1465	0.2458	0.0072	0.0479	0.0339	-0.0513	0.1649	0.1494	-0.0672	-0.0004
4	-0.1711	0.1420	0.1874	0.3296	0.0588	-0.0207	0.1703	0.1024	-0.0350	-0.1717
5	0.0817	-0.0768	0.0201	0.1478	0.0446	-0.0111	0.0714	-0.1764	0.0495	0.0847
6	0.1638	0.0729	-0.0551	0.1746	-0.1020	0.0182	-0.0831	-0.2341	-0.1346	0.0520
7	0.0727	0.0997	0.1612	0.2048	0.0269	-0.0762	-0.0289	-0.1561	-0.0511	0.0168
8	-0.1750	-0.0405	0.1308	-0.0007	0.0768	0.0336	0.0484	-0.1847	-0.0260	0.0682
9	-0.0192	-0.0491	0.0203	0.1640	-0.0607	-0.0120	-0.0439	-0.0507	-0.3031	0.0702
10	-0.0795	0.0778	-0.0882	0.2282	-0.0271	-0.0261	0.0147	-0.0010	-0.1001	0.0788
11	0.1574	0.1146	0.1188	0.3010	-0.0032	-0.0084	0.1700	0.0894	-0.2102	-0.1036
12	0.1867	0.0520	0.1374	0.2969	-0.0377	-0.0365	0.2362	0.1172	-0.1607	-0.0614
13	0.0501	0.0623	0.0786	0.0853	0.0639	-0.0002	-0.0505	-0.1161	-0.0751	0.0402
14	-0.1217	0.0970	0.1055	-0.0536	-0.0209	-0.0617	0.3140	0.1279	-0.0223	0.0171
15	0.1270	-0.0513	-0.0062	0.0100	-0.0250	-0.0736	0.1454	-0.0545	-0.1259	-0.0367
16	0.0698	-0.0803	-0.1373	-0.0678	-0.0074	-0.0780	-0.0166	-0.1999	0.0481	-0.1063
17	-0.0455	0.0255	-0.1059	0.0352	0.1316	-0.0430	0.0120	-0.1485	-0.0695	-0.0065
18	-0.0594	0.0037	-0.1599	0.0509	0.0124	-0.0369	0.1600	-0.0015	0.0985	-0.1632
19	0.0298	-0.0916	0.1344	0.0388	0.1443	-0.0535	-0.0777	0.0812	0.2398	-0.1973
20	-0.1397	0.0448	0.0848	0.1355	-0.2068	-0.1865	0.3668	0.3069	-0.0806	0.0298
21	0.2048	-0.4477	-0.1247	-0.3971	0.2955	-0.0430	-0.1228	-0.2503	0.2176	-0.1395
22	-0.1755	0.4621	0.1917	0.4217	-0.2501	0.1433	0.0597	0.1761	-0.1897	0.2966
23	0.0538	-0.0106	-0.0635	-0.0592	-0.0124	-0.1047	-0.1111	-0.0965	0.0847	-0.1118
24	0.0274	-0.2958	-0.0368	-0.1175	0.0500	0.0006	-0.0745	-0.3450	-0.0157	-0.0655
25	0.0374	0.2173	-0.0187	0.0170	0.0548	0.1499	-0.0982	0.1194	-0.0400	-0.0327
26	0.4391	-0.1306	-0.0233	-0.1554	0.1828	0.0297	-0.1444	-0.3368	0.0964	-0.0423
27	0.3905	-0.3383	-0.2774	-0.1821	0.2574	-0.4842	0.1068	0.0464	0.3539	-0.5496
28	0.4841	-0.0344	-0.0904	0.0829	-0.0234	-0.2430	0.0449	0.0585	-0.2453	-0.0430
29	0.5100	-0.2742	-0.0580	-0.0433	0.0045	-0.0778	-0.1079	-0.4428	-0.1402	-0.0615
30	0.1083	-0.1283	-0.0216	-0.2856	0.2345	0.0947	-0.0742	-0.1884	0.4856	-0.2363
31	1.0000	-0.2048	-0.2309	-0.1937	0.2076	-0.3297	0.0091	-0.2424	0.0949	-0.2596
32	-0.2048	1.0000	0.2439	0.4073	-0.2686	0.2845	-0.1270	0.1779	-0.2557	0.3636
33	-0.2309	0.2439	1.0000	0.3078	-0.0194	0.3504	0.0319	0.0603	-0.2451	0.3223
34	-0.1937	0.4073	0.3078	1.0000	-0.1940	0.2444	0.0719	0.2123	-0.3783	0.2748
35	0.2076	-0.2686	-0.0194	-0.1940	1.0000	-0.1363	-0.0404	-0.0650	0.4129	-0.2832
36	-0.3297	0.2845	0.3504	0.2444	-0.1363	1.0000	-0.2578	-0.1443	-0.2817	0.6077
37	0.0091	-0.1270	0.0319	0.0719	-0.0404	-0.2578	1.0000	0.3974	0.0151	-0.1804
38	-0.2424	0.1779	0.0603	0.2123	-0.0650	-0.1443	0.3974	1.0000	-0.0428	-0.0451
39	0.0949	-0.2557	-0.2451	-0.3783	0.4129	-0.2817	0.0151	-0.0428	1.0000	-0.4824
40	-0.2596	0.3636	0.3223	0.2748	-0.2832	0.6077	-0.1804	-0.0451	-0.4824	1.0000
41	0.0266	0.0717	-0.1383	-0.0382	-0.0171	-0.0110	-0.0780	-0.0432	-0.0257	-0.0430
42	0.4229	-0.1509	-0.2034	-0.2698	0.2629	-0.3968	-0.0136	0.0057	0.2697	-0.5265

D.03.B(5)

	41	42
1	-0.0085	-0.1105
2	0.0486	0.0268
3	0.0971	-0.0003
4	0.0688	0.0642
5	0.0752	0.0372
6	0.0594	0.0670
7	0.0118	0.1173
8	0.0465	-0.0118
9	0.0191	0.0784
10	0.0625	-0.0317
11	0.1258	0.0933
12	0.0974	0.1618
13	0.1254	0.0369
14	0.0703	-0.0692
15	0.1388	-0.0784
16	0.1997	0.0246
17	0.1567	-0.0495
18	0.0013	-0.0025
19	0.0617	0.0262
20	0.1689	-0.1470
21	-0.1125	0.1697
22	0.0526	-0.1979
23	-0.0847	0.1026
24	0.1158	0.0263
25	-0.0407	0.0587
26	-0.0343	0.1375
27	-0.0180	0.4794
28	0.0021	0.0646
29	-0.1719	0.1343
30	0.0170	0.2364
31	0.0266	0.4229
32	0.0717	-0.1509
33	-0.1383	-0.2034
34	-0.0382	-0.2698
35	-0.0171	0.2629
36	-0.0110	-0.3988
37	-0.0780	-0.0136
38	-0.0432	0.0057
39	-0.0257	0.2697
40	-0.0430	-0.5265
41	1.0000	0.1062
42	0.1062	1.0000

APPENDIX D.04.A
Means, SD, S.E. of Mean
Core Female Art Students (N.=93)

MEANS AND

VARIABLE NC.	MEAN	S.D.	S.E. OF MEAN
1	50.2150536	9.72653055	1.00859423
2	54.9247308	12.8868272	1.33630173
3	77.0430107	15.5002881	1.60730501
4	64.9784937	24.0470426	2.49356213
5	14.3870968	3.98920301	0.41366108
6	16.0537634	5.51946187	0.57234153
7	10.6989247	4.26763529	0.44253317
8	14.0645161	4.54400289	0.47119115
9	3.41935483	2.59733337	0.26933092
10	8.52688169	4.68714970	0.48603478
11	56.3870964	14.7788260	1.53249285
12	45.8602147	12.8389604	1.33133817
13	22.1075268	5.17196012	0.53630728
14	8.12903225	2.13778508	0.22167798
15	13.0967741	6.00192744	0.62237088
16	20.5806451	5.41800994	0.56182145
17	6.24731177	6.76251686	0.70124033
18	19.8494623	10.9026773	1.13055497
19	34.9677415	9.52165782	0.98734991
20	42.2580643	6.56887054	0.68116014
21	33.5053763	6.45153034	0.66899253
22	54.4946232	7.71872783	0.80039478
23	33.7419353	7.40578884	0.76794452
24	37.4946232	6.01017851	0.62322647
25	38.4838705	7.80135435	0.80896276
26	8.94623649	2.82598767	0.29304127
27	14.0967741	3.41373330	0.35398765
28	12.8387096	3.77719170	0.39167653
29	13.0215054	4.13883597	0.42917730
30	9.76344085	2.98327857	0.30935158
31	12.1612903	4.77605003	0.49525331
32	11.9462365	2.69203940	0.27915148
33	9.38709676	2.62526259	0.27222705
34	15.5591397	3.15698752	0.32736436
35	9.55913973	2.77591449	0.28784892
36	11.3333333	3.47141492	0.35996896
37	10.5806451	2.93525228	0.30437148
38	13.4301075	3.06238660	0.31755469
39	9.40860212	2.67124981	0.27699570
40	13.8494623	4.65072697	0.48225792
41	51.9677415	4.38488364	0.45469125
42	47.9247308	10.0479670	1.04192562

APPENDIX D.04.B
Correlation Matrix
Core Female Art Students (N.=93)

CORRELATION MATRIX PMN UNIFIED PAGE 3

	1	2	3	4	5	6	7	8	9	10
1	1.0000	0.3195*	0.4841**	0.1740	-0.0038	0.0459	0.0519	0.0258	-0.1563	0.0979
2	0.3195*	1.0000	0.4219**	0.1316	-0.1648	-0.0690	0.0901	-0.0227	0.0201	-0.0053
3	0.4841**	0.4219**	1.0000	0.5255**	0.0419	-0.0040	0.0919	0.0946	-0.0380	0.1865
4	0.1740	0.1316	0.5255**	1.0000	0.2342	0.2097	0.2962	0.2415	0.0792	0.3123
5	-0.0038	-0.1648	0.0419	0.2342	1.0000	0.6467	0.6198	0.3626	0.2968	0.3709
6	0.0459	-0.0690	-0.0040	0.2097	0.6467	1.0000	0.7321	0.1984	0.2031	0.3632
7	0.0519	0.0901	0.0919	0.2962*	0.6198	0.7321	1.0000	0.1877	0.1625	0.4666
8	0.0258	-0.0227	0.0946	0.2415	0.3626	0.1984	0.1877	1.0000	-0.0226	0.2541
9	-0.1563	0.0201	-0.0380	0.0792	0.2968	0.2031	0.1625	-0.0226	1.0000	0.3031
10	0.0979	-0.0053	0.1865	0.3123*	0.3709	0.3632	0.4666	0.2541	0.3031	1.0000
11	-0.0097	-0.0950	-0.0042	0.3219*	0.4567	0.4540	0.5344	0.1571	0.2613	0.2851
12	0.0162	-0.1747	-0.0059	0.3812**	0.4130	0.2851	0.3805	0.2677	0.1520	0.2704
13	-0.1174	-0.0431	0.1809	0.5656**	0.2972	0.2336	0.3767	0.2240	0.2321	0.3048
14	0.1398	-0.0561	0.0854	0.3591**	0.1470	0.0805	0.2426	0.0170	0.0039	0.1407
15	0.0624	0.2155	0.2697*	0.2789*	0.1028	-0.0248	0.1667	0.1711	0.0573	0.0890
16	0.0242	0.0330	0.1181	0.2272	0.0986	0.0062	0.1811	0.1662	0.0119	0.0961
17	0.1656	0.1762	0.0663	0.0565	-0.0745	0.2131	0.1932	-0.1876	0.0373	0.0723
18	-0.2516*	-0.3659**	-0.3317*	-0.2451	-0.0031	-0.1306	-0.2353	-0.0211	0.2844	-0.0946
19	-0.0937	-0.1883	-0.0849	-0.1093	0.0962	-0.0730	-0.1428	0.0862	-0.0359	-0.0366
20	0.1815	0.2463	0.1011	0.1679	0.1525	0.1708	0.1955	-0.0599	0.0560	0.0548
21	-0.0321	0.0167	-0.0393	-0.1794	-0.1471	-0.1970	-0.1247	-0.1620	-0.1412	-0.3101
22	0.0821	0.1388	0.2046	0.2601	0.2511	0.2568	0.3062	0.2219	0.1961	0.2565
23	0.0017	-0.1663	-0.1737	-0.0685	-0.2225	-0.2267	-0.1562	-0.1413	-0.1169	-0.0283
24	-0.1621	0.0323	-0.1997	-0.2641	-0.0715	-0.0513	-0.2225	-0.1719	0.0966	-0.1058
25	-0.0856	-0.1245	0.0601	0.0329	-0.0875	-0.0519	-0.0527	0.2536	-0.1029	0.0381
26	-0.1150	0.0142	-0.1838	-0.0299	0.0424	-0.0560	0.0419	-0.0243	0.0964	-0.0118
27	0.0177	-0.0846	0.0743	0.0435	-0.0978	-0.1070	-0.0808	-0.0151	-0.2069	-0.1384
28	-0.0742	0.0165	-0.0727	0.0430	0.3822	0.2423	0.2377	0.0785	0.2585	0.1663
29	-0.0098	0.0023	-0.1391	0.0062	0.2095	0.1555	0.2527	-0.1255	0.1528	0.0745
30	0.1658	-0.0856	0.0719	-0.0878	-0.1384	-0.1860	-0.1388	0.0789	-0.1610	-0.2965
31	-0.1079	0.0124	-0.0927	-0.0988	0.1678	0.0306	0.0819	0.0010	0.2407	0.0758
32	-0.0813	0.0823	-0.0231	0.0954	-0.0699	-0.0276	0.0175	0.1256	0.1230	0.0083
33	0.0227	0.1943	0.1104	-0.0505	-0.0518	-0.0615	0.0037	-0.0240	0.0126	0.0548
34	-0.0496	0.0911	0.0506	0.1012	0.0456	-0.0173	0.1078	0.0657	0.0997	0.1187
35	0.0329	-0.0447	-0.0228	-0.0579	-0.0885	-0.0949	-0.1398	0.0307	-0.1218	-0.3094
36	-0.0784	-0.0633	-0.1728	-0.1713	0.0196	-0.0129	-0.0518	-0.0682	0.0458	-0.0183
37	-0.0783	-0.0552	-0.0555	0.1121	0.0502	0.1088	0.0801	-0.0297	0.0746	0.1095
38	0.0640	-0.0176	0.0493	0.2958*	-0.0431	0.0841	0.0649	0.1597	-0.0011	0.1787
39	0.1384	-0.0572	0.0917	0.0375	-0.0140	-0.1669	-0.0530	0.0229	-0.2224	-0.1572
40	-0.1283	0.1249	-0.0589	-0.0281	0.0829	0.0287	0.0185	-0.0057	0.1969	-0.0203
41	0.0302	0.0521	-0.1741	0.0067	-0.1254	-0.0345	0.0326	-0.1101	-0.2259	-0.0647
42	-0.0898	-0.0179	-0.1100	-0.1439	-0.1001	-0.1254	-0.0687	-0.0477	-0.0379	-0.1833

FEMALE ART GETZALS CORRELATION MATRIX D.04 B (2) PMN UNIFIED PAGE 4

	11	12	13	14	15	16	17	18	19	20
1	-0.0097	0.0162	-0.1174	0.1398	0.0624	0.0242	0.1656	-0.2516	-0.0937	0.1815
2	-0.0950	-0.1747	-0.0431	-0.0561	0.2155	0.0330	0.1762	-0.3659	-0.1883	0.2463
3	-0.0042	-0.0059	0.1809	0.0854	0.2697	0.1161	0.0663	-0.3317	-0.0849	0.1011
4	0.3219	0.3812	0.5656	0.3591	0.2789	0.2272	0.0565	-0.2451	-0.1093	0.1679
5	0.4567	0.4130	0.2972	0.1470	0.1028	0.0986	-0.0745	-0.0031	0.0962	0.1525
6	0.4540	0.2851	0.2336	0.0805	-0.0248	0.0062	0.2131	-0.1306	-0.0730	0.1708
7	0.5344	0.3805	0.3767	0.2426	0.1667	0.1811	0.1932	-0.2353	-0.1428	0.1955
8	0.1571	0.2677	0.2240	0.0170	0.1711	0.1662	-0.1876	-0.0211	0.0862	-0.0599
9	0.2613	0.1520	0.2321	0.0039	0.0573	0.0119	0.0373	0.2844	-0.0359	0.0560
10	0.2851	0.2704	0.3048	0.1407	0.0890	0.0961	0.0723	-0.0946	-0.0366	0.0548
11	1.0000	0.6725	0.4760	0.0806	0.2096	0.2636	0.0678	-0.0510	-0.0570	0.0387
12	0.6725	1.0000	0.5556	0.2858	0.3649	0.2946	-0.1881	-0.2186	0.0234	0.0145
13	0.4760	0.5556	1.0000	0.4244	0.4016	0.3775	0.0216	-0.1107	-0.0544	0.0622
14	0.0806	0.2858	0.4244	1.0000	0.1795	0.1492	0.0083	-0.0938	-0.1247	0.1176
15	0.2096	0.3649	0.4016	0.1795	1.0000	0.4849	0.0431	-0.2408	-0.0886	0.1518
16	0.2636	0.2946	0.3775	0.1492	0.4849	1.0000	0.1817	-0.2175	0.0010	-0.0437
17	0.0678	-0.1881	0.0216	0.0083	0.0431	0.1817	1.0000	-0.0800	-0.1241	-0.0338
18	-0.0510	-0.2186	-0.1107	-0.0938	-0.2408	-0.2175	-0.0800	1.0000	0.1106	-0.0960
19	-0.0570	0.0234	-0.0544	-0.1247	-0.0886	0.0010	-0.1241	0.1106	1.0000	-0.0049
20	0.0387	0.0145	0.0622	0.1176	0.1518	-0.0437	-0.0338	-0.0960	-0.0049	1.0000
21	-0.0608	-0.1448	-0.1104	-0.1128	-0.0075	0.0403	0.1057	0.1570	-0.1245	-0.0898
22	0.0714	0.1685	0.1329	0.1641	0.0952	0.1077	0.0382	-0.1646	0.0536	0.1205
23	0.0760	0.0795	-0.0486	0.0708	-0.1550	-0.0715	0.0193	0.0939	0.1292	-0.3152
24	-0.0686	-0.1443	-0.1816	-0.2461	-0.0456	-0.0640	-0.0579	0.0705	0.0535	-0.1897
25	-0.1175	-0.0419	0.0919	-0.0129	0.0343	0.0365	-0.0416	-0.0350	-0.1408	-0.4258
26	0.0570	0.0537	-0.0234	-0.2183	-0.1958	-0.0831	-0.1000	0.1119	0.1110	-0.0783
27	-0.0046	0.0422	0.0487	0.1264	-0.1034	0.0863	-0.0764	-0.1237	-0.0514	-0.1732
28	0.2543	0.2360	0.1962	-0.0539	0.1325	-0.0203	-0.0005	-0.0927	-0.0255	0.2120
29	0.1413	0.2517	0.1187	0.0107	0.0074	0.1153	0.1175	-0.1288	-0.0179	0.0742
30	0.0041	-0.0142	-0.1357	-0.1213	-0.0837	0.0247	-0.0256	0.1917	-0.0110	-0.1011
31	0.0550	0.0642	0.0099	-0.0798	0.0237	-0.0415	0.0442	0.0297	0.0379	-0.0017
32	0.1131	0.1460	0.1089	0.0541	-0.0360	-0.0217	-0.0972	-0.0880	0.3209	0.0524
33	-0.1868	-0.1886	-0.0655	0.0181	0.0121	-0.1214	-0.0324	0.0229	-0.0739	0.0818
34	-0.0962	-0.0477	-0.0317	0.0601	-0.0683	-0.1870	-0.0305	-0.0190	0.2139	0.2477
35	0.0002	0.0068	0.0033	-0.0691	-0.0144	0.0909	-0.0509	0.0665	-0.1251	-0.1791
36	-0.0994	-0.1080	-0.2284	0.0820	-0.1732	-0.1364	0.0904	0.1527	0.0326	-0.1011
37	-0.0934	0.0247	0.1383	0.2807	-0.0106	-0.1397	-0.0106	0.1081	0.0629	0.2532
38	0.0525	0.2451	0.2551	0.3733	0.2242	0.1263	-0.0718	-0.1462	-0.1710	0.1176
39	0.0805	0.0423	0.0094	0.0706	-0.0018	0.0623	-0.0869	-0.1046	-0.1755	-0.0767
40	-0.0434	-0.0186	-0.0734	-0.0778	0.0087	-0.0388	-0.0068	0.0173	0.1133	0.0870
41	-0.0900	-0.0211	-0.0468	0.1176	0.0551	0.1028	0.2484	-0.1831	-0.0690	0.0614
42	-0.0095	0.0468	0.0248	-0.0623	-0.0076	0.1629	0.0556	0.0053	-0.0200	-0.2581

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	21	22	23	24	25	26	27	28	29	30
1	-0.0321	0.0821	0.0017	-0.1621	-0.0856	-0.1150	0.0177	-0.0742	-0.0098	0.1658
2	0.0167	0.1388	-0.1663	0.0323	-0.1245	0.0142	-0.0846	0.0165	0.0023	-0.0856
3	-0.0393	0.2046	-0.1737	-0.1997	0.0601	-0.1838	0.0743	-0.0727	-0.1391	0.0719
4	-0.1794	0.2601	-0.0685	-0.2641	0.0329	-0.0299	0.0435	0.0430	0.0062	-0.0878
5	-0.1471	0.2511	-0.2225	-0.0715	-0.0875	0.0424	-0.0978	0.3822	0.2095	-0.1384
6	-0.1970	0.2588	-0.2267	-0.0513	-0.0519	-0.0500	-0.1070	0.2423	0.1955	-0.1880
7	-0.1247	0.3062	-0.1562	-0.2225	-0.0527	0.0419	-0.0808	0.2377	0.2527	-0.1388
8	-0.1620	0.2219	-0.1413	-0.1719	0.2536	-0.0243	-0.0151	0.0785	-0.1255	0.0789
9	-0.1412	0.1961	-0.1169	0.0966	-0.1029	0.0964	-0.2069	0.2585	0.1528	-0.1610
10	-0.3101	0.2565	-0.0283	-0.1058	0.0381	-0.0118	-0.1384	0.1663	0.0745	-0.2965
11	-0.0608	0.0714	0.0760	-0.0686	-0.1175	0.0570	-0.0046	0.2543	0.1413	0.0041
12	-0.1448	0.1665	0.0795	-0.1443	-0.0419	0.0537	0.0422	0.2360	0.2517	-0.0142
13	-0.1104	0.1329	-0.0486	-0.1818	0.0919	-0.0234	0.0487	0.1962	0.1187	-0.1357
14	-0.1128	0.1641	0.0708	-0.2461	-0.0129	-0.2183	0.1264	-0.0539	0.0107	-0.1213
15	-0.0075	0.0952	-0.1550	-0.0456	0.0343	-0.1958	-0.1034	0.1325	0.0074	-0.0837
16	0.0403	0.1077	-0.0715	-0.0640	0.0365	-0.0831	0.0863	-0.0203	0.1153	0.0247
17	0.1057	0.0382	0.0193	-0.0579	-0.0416	-0.1000	-0.0764	-0.0005	0.1175	-0.0256
18	0.1570	-0.1646	0.0939	0.0705	-0.0350	0.1119	-0.1237	-0.0927	-0.1288	0.1917
19	-0.1245	0.0536	0.1292	0.0535	-0.1408	0.1110	-0.0514	-0.0255	-0.0179	-0.0110
20	-0.0898	0.1205	-0.3152	-0.1897	-0.4258	-0.0783	-0.1732	0.2120	0.0742	-0.1011
21	1.0000	-0.3897	-0.1660	0.2015	-0.2859	0.1569	0.0412	-0.0604	0.0623	0.2412
22	-0.3897	1.0000	-0.3739	-0.3917	-0.0780	-0.1478	-0.1755	0.2540	0.0466	-0.2804
23	-0.1660	-0.3739	1.0000	-0.0911	-0.0584	0.1759	0.1390	-0.2716	-0.1434	0.1689
24	0.2015	-0.3917	-0.0911	1.0000	-0.3156	0.1590	0.1280	0.1592	0.2189	0.0333
25	-0.2859	-0.0780	-0.0584	-0.3156	1.0000	-0.1847	0.0272	-0.2791	-0.1915	-0.0179
26	0.1589	-0.1478	0.1759	0.1590	-0.1847	1.0000	-0.1347	0.2843	0.3198	0.1003
27	0.0412	-0.1755	0.1390	0.1280	0.0272	-0.1347	1.0000	-0.0620	-0.1171	0.1784
28	-0.0604	0.2540	-0.2716	0.1592	-0.2791	0.2843	-0.0620	1.0000	0.4355	-0.2745
29	0.0623	0.0466	-0.1434	0.2189	-0.1915	0.3198	-0.1171	0.4355	1.0000	-0.1325
30	0.2412	-0.2804	0.1689	0.0333	-0.0179	0.1003	0.1784	-0.2745	-0.1325	1.0000
31	0.0312	0.1122	-0.1058	0.3153	-0.2696	0.3461	0.1197	0.6269	0.5266	0.0363
32	-0.3257	0.2691	0.0882	-0.2100	0.0949	-0.0918	-0.0692	-0.0190	-0.0760	-0.2182
33	-0.0919	0.0650	-0.0921	-0.1480	0.1988	-0.1569	-0.1558	0.0261	-0.0858	-0.2644
34	-0.1923	0.3017	-0.0235	-0.1820	-0.1537	-0.0721	0.0222	0.1553	-0.0425	-0.2155
35	0.3555	-0.2576	0.0140	0.1728	-0.0397	0.1313	0.2603	-0.0691	-0.0711	0.4138
36	0.0545	-0.0289	0.1171	-0.1877	0.1007	-0.1821	-0.3651	-0.2147	-0.1185	-0.1655
37	-0.1322	-0.0440	0.1390	-0.1853	-0.0224	0.0562	-0.0068	-0.0268	-0.1630	-0.0661
38	-0.3643	0.2254	0.0380	-0.3796	0.2260	-0.3804	-0.0134	-0.1847	-0.1525	-0.0815
39	0.2610	-0.2904	0.1213	0.0557	-0.0226	0.0951	0.2197	-0.2530	-0.1080	0.5347
40	-0.0590	0.1913	-0.0706	-0.1914	-0.0016	-0.0296	-0.4722	0.1224	0.1097	-0.3747
41	-0.0663	0.0271	0.1336	-0.0435	-0.1152	0.1911	0.3088	0.1047	0.1695	-0.0870
42	0.1864	-0.1348	0.0866	0.2854	-0.1105	0.1568	0.3878	0.0100	0.1017	0.3065

FEMALE ART GETZALS   CORRELATION MATRIX   D. 04. B (4)   PMN UNIFIED   PAGE 6

	31	32	33	34	35	36	37	38	39	40
1	-0.1079	-0.0813	0.0227	-0.0496	0.0329	-0.0784	-0.0783	0.0640	0.1384	-0.1283
2	0.0124	0.0823	0.1943	0.0911	-0.0447	-0.0633	-0.0552	-0.0176	-0.0572	0.1249
3	-0.0927	-0.0231	0.1104	0.0506	-0.0228	-0.1728	-0.0555	0.0493	0.0917	-0.0589
4	-0.0988	0.0954	-0.0505	0.1012	-0.0579	-0.1713	0.1121	0.2958	0.0375	-0.0281
5	0.1678	-0.0699	-0.0518	0.0456	-0.0885	0.0196	0.0502	-0.0431	-0.0140	0.0829
6	0.0306	-0.0276	-0.0615	-0.0173	-0.0949	-0.0129	0.1088	0.0841	-0.1689	0.0287
7	0.0819	0.0175	0.0037	0.1078	-0.1398	-0.0518	0.0801	0.0649	-0.0530	0.0185
8	0.0010	0.1256	-0.0240	0.0657	0.0307	-0.0682	-0.0297	0.1597	0.0229	-0.0057
9	0.2407	0.1230	0.0126	0.0997	-0.1218	0.0458	0.0746	-0.0011	-0.2224	0.1969
10	0.0758	0.0083	0.0548	0.1187	-0.3094	-0.0183	0.1095	0.1787	-0.1572	-0.0203
11	0.0550	0.1131	-0.1868	-0.0962	0.0002	-0.0994	-0.0934	0.0525	0.0805	-0.0434
12	0.0642	0.1460	-0.1886	-0.0477	0.0068	-0.1060	0.0247	0.2451	0.0423	-0.0186
13	0.0099	0.1089	-0.0655	-0.0317	0.0033	-0.2284	0.1383	0.2551	0.0094	-0.0734
14	-0.0798	0.0541	0.0181	0.0601	-0.0691	0.0820	0.2807	0.3733	0.0706	-0.0778
15	0.0237	-0.0360	0.0121	-0.0683	-0.0144	-0.1732	-0.0106	0.2242	-0.0018	0.0087
16	-0.0415	-0.0217	-0.1214	-0.1870	0.0909	-0.1364	-0.1397	0.1263	0.0623	-0.0388
17	0.0442	-0.0972	-0.0324	-0.0305	-0.0509	0.0904	-0.0106	-0.0718	-0.0869	-0.0068
18	0.0297	-0.0880	0.0229	-0.0190	0.0685	0.1527	0.1081	-0.1462	-0.1046	0.0173
19	0.0379	0.3209	-0.0739	0.2139	-0.1251	0.0326	0.0629	-0.1710	-0.1755	0.1133
20	-0.0017	0.0524	0.0818	0.2477	-0.1791	-0.1011	0.2532	0.1176	-0.0767	0.0870
21	0.0312	-0.3257	-0.0919	-0.1923	0.3555	0.0545	-0.1322	-0.3643	0.2610	-0.0590
22	0.1122	0.2691	0.0650	0.3017	-0.2576	-0.0289	-0.0440	0.2254	-0.2904	0.1913
23	-0.1058	0.0882	-0.0921	-0.0235	0.0140	0.1171	0.1390	0.0380	0.1213	-0.0706
24	0.3153	-0.2100	-0.1480	-0.1820	0.1728	-0.1877	-0.1853	-0.3796	0.0557	-0.1914
25	-0.2696	0.0949	0.1988	-0.1537	-0.0397	0.1007	-0.0224	0.2260	-0.0226	-0.0016
26	0.3461	-0.0918	-0.1569	-0.0721	0.1313	-0.1821	0.0562	-0.3804	0.0951	-0.0296
27	0.1197	-0.0692	-0.1558	0.0222	0.2603	-0.3651	-0.0068	-0.0134	0.2197	-0.4722
28	0.6269	-0.0190	0.0261	0.1553	-0.0691	-0.2147	-0.0268	-0.1847	-0.2530	0.1224
29	0.5266	-0.0760	-0.0858	-0.0425	-0.0711	-0.1185	-0.1630	-0.1525	-0.1080	0.1097
30	0.0363	-0.2182	-0.2644	-0.2155	0.4138	-0.1655	-0.0661	-0.0815	0.5347	-0.3747
31	1.0000	-0.0737	-0.1411	0.0711	0.1022	-0.3783	-0.0789	-0.3325	-0.0495	-0.1393
32	-0.0737	1.0000	0.0230	0.1980	-0.2883	0.0682	0.0700	0.1597	-0.3642	0.1218
33	-0.1411	0.0230	1.0000	0.1677	-0.2657	0.3650	-0.1268	0.1251	-0.2382	0.3734
34	0.0711	0.1980	0.1677	1.0000	-0.3697	0.1018	0.0866	0.1424	-0.3277	0.2338
35	0.1022	-0.2883	-0.2657	-0.3697	1.0000	-0.3252	-0.0896	-0.1398	0.4394	-0.3319
36	-0.3783	0.0682	0.3650	0.1018	-0.3252	1.0000	-0.0395	0.0855	-0.3091	0.6347
37	-0.0789	0.0700	-0.1268	0.0866	-0.0896	-0.0395	1.0000	0.2089	0.0346	-0.1329
38	-0.3325	0.1597	0.1251	0.1424	-0.1398	0.0855	0.2089	1.0000	-0.0443	0.0679
39	-0.0495	-0.3642	-0.2382	-0.3277	0.4394	-0.3091	0.0346	-0.0443	1.0000	-0.4876
40	-0.1393	0.1218	0.3734	0.2338	-0.3319	0.6347	-0.1329	0.0679	-0.4876	1.0000
41	0.1923	0.0523	-0.1358	0.0476	-0.0083	-0.3092	0.0673	0.1540	0.0540	-0.2236
42	0.3523	-0.1022	-0.2070	-0.1686	0.3682	-0.4689	-0.0785	-0.1890	0.3579	-0.3973

	41	42
1	0.0302	-0.0898
2	0.0521	-0.0179
3	-0.1741	-0.1100
4	0.0067	-0.1439
5	-0.1254	-0.1001
6	-0.0345	-0.1254
7	0.0326	-0.0687
8	-0.1101	-0.0477
9	-0.2259	-0.0379
10	-0.0647	-0.1833
11	-0.0900	-0.0095
12	-0.0211	0.0468
13	-0.0468	0.0248
14	0.1176	-0.0623
15	0.0551	-0.0076
16	0.1028	0.1629
17	0.2484	0.0556
18	-0.1831	0.0053
19	-0.0690	-0.0200
20	0.0614	-0.2581
21	-0.0663	0.1864
22	0.0271	-0.1348
23	0.1336	0.0866
24	-0.0435	0.2854
25	-0.1152	-0.1105
26	0.1911	0.1568
27	0.3088	0.3878
28	0.1047	0.0100
29	0.1695	0.1017
30	-0.0870	0.3065
31	0.1923	0.3529
32	0.0523	-0.1022
33	-0.1358	-0.2070
34	0.0476	-0.1686
35	-0.0083	0.3682
36	-0.3092	-0.4689
37	0.0673	-0.0785
38	0.1540	-0.1890
39	0.0540	0.3579
40	-0.2236	-0.3973
41	1.0000	0.3120
42	0.3120	1.0000

APPENDIX D.05

DEGREES OF FREEDOM, SUMS OF SQUARES, MEAN SQUARES AND F VALUES

EFFECTS OF SEX, MAJOR, AND INTERACTION

Variables	Error (DF=171)		Interaction, Sex & Major (DF=3)			Sex (DF=1)			Major (DF=3)		
	SS	MS	SS	MS	F	SS	MS	F	SS	MS	F
Ergic Tension	3778.0	22.1	75.7	25.2	1.14	8.8	8.8	.40	44.5	14.8	.67
Unusual Uses	3961.7	23.2	9.5	3.2	.14	10.1	10.1	.43	66.9	22.3	.96
Brick Fluency	6024.9	35.2	79.7	26.6	.75	.18	.18	.01	189.0	63.0	1.8
Brick Flexibility	3052.6	17.9	8.9	2.97	.17	20.5	20.5	1.2	137.5	45.8	2.6
Ideational Fluency	3660.9	21.4	149.2	49.7	2.3	12.7	12.7	.6	22.6	7.5	.35
Object Question	3985.9	23.3	66.6	22.2	.95	57.8	57.8	2.5	147.6	49.2	2.1
Word Association Fluency . .	40032.1	234.1	353.3	117.8	.5	412.0	412.0	1.8	743.5	247.8	1.1
Word Association Flexibility.	27368.3	160.0	217.9	72.6	.5	150.3	150.3	.93	182.8	60.9	.38
Wonderlic I.Q.	4606.7	26.9	170.8	56.9	2.1	2.9	2.9	.11	28.6	9.5	.35
16 Personality Factors I.Q. .	727.6	4.3	21.6	7.2	1.7	.08	.08	.02	14.0	4.7	1.1
Spatial Visualization	6514.3	38.1	179.1	59.7	1.6	1013.5	1013.5	26.6	345.6	115.2	3.0
Hidden Shapes	5345.5	31.3	59.7	19.9	.64	4.03	4.03	.13	221.5	73.9	2.4
Matches	8155.6	47.7	205.5	68.5	1.4	9.4	9.4	.20	34.2	11.4	.24
Perceptual Memory	21245.5	124.2	1290.3	430.1	3.5	31.4	31.4	.25	225.5	75.2	.61
Welch Art Preference	19780.9	115.7	264.4	88.1	.76	15.5	15.5	.13	652.6	217.5	1.9
Theoretical Value	7565.7	44.2	81.2	27.1	.61	197.5	197.5	4.5	360.2	120.1	2.7
Economic Value	8929.3	52.2	215.6	71.9	1.4	177.6	177.6	3.4	969.7	323.2	6.2
Aesthetic Value	9439.4	55.2	169.6	56.5	1.0	52.7	52.7	.95	810.1	270.0	4.9
Social Value	8041.4	47.0	32.9	10.9	.23	120.7	120.7	2.6	473.9	157.9	3.4
Political Value	5544.4	32.4	141.6	47.2	1.5	28.3	28.3	.9	267.7	89.2	2.8
Religious Value	12827.7	75.0	21.5	7.2	.10	176.9	176.9	2.4	301.6	100.5	1.3
Cyclothymia	1461.5	8.5	3.2	1.1	.12	116.0	116.0	13.6	140.5	46.8	5.5
Ego-strength	2556.5	14.9	124.8	41.6	2.8	.43	.43	.03	5.5	1.8	.12
Dominance	2205.4	12.9	48.1	16.0	1.2	58.9	59.9	4.6	44.9	14.9	1.2
Surgency	2859.5	16.7	69.7	23.2	1.4	16.9	16.9	1.0	130.9	43.6	2.6
Superego	1538.2	8.9	16.8	5.6	.6	82.5	82.5	9.2	173.0	57.7	6.4
Parmia	4423.3	25.9	39.5	13.2	.5	57.1	57.1	2.2	29.3	9.8	.38
Premsia	1573.5	9.2	13.2	4.4	.5	135.7	135.7	14.7	169.6	56.5	6.1
Protension	1339.4	7.8	85.2	28.4	3.6	27.6	27.6	3.5	52.5	17.5	2.2
Autia	1631.2	9.5	13.9	4.6	.49	33.4	33.4	3.5	153.8	51.3	5.4
Shrewdness	1035.5	6.1	30.7	10.2	1.7	23.5	23.5	3.9	157.5	52.5	8.7
Guilt	2380.8	13.9	130.9	43.6	3.1	.03	.03	.0	1.4	.45	.03
Radicalism	1415.3	8.3	7.3	2.4	.3	.06	.06	.01	45.9	15.3	1.8
Self-Sufficiency	1604.1	9.4	33.4	11.1	1.2	.84	.84	.07	77.5	25.8	2.8
Self-Sentiment	1293.5	7.6	39.4	13.1	1.7	7.3	7.3	.97	93.9	31.3	4.1

APPENDIX D.06

IMAGE COVARIANCE FACTOR ANALYSIS - ROTATED FACTOR MAT IX

PMN UNIFIED PAGE

N = 179

		1 "Creative Personality"	2 "Divergent Thinking"	3 "Strong Ego"	4 "Dominance"	5 "General Intelligence"	"Artistic Performance"	7 "Theoretical Value"	8 "Religious Value"	9 "Social Value"	10
DAP-1	1	0.01069	-0.00417	-0.08267	-0.13781	-0.00328	0.44797	0.12484	-0.01944	0.05926	-0.02207
DAP-2	2	0.09397	-0.03404	-0.12880	-0.04289	0.05041	0.39967	0.09332	-0.01180	-0.04095	0.06680
ART GRADES	3	0.08809	0.09251	0.03614	-0.10420	0.06336	0.61951	0.02809	0.04137	-0.07478	-0.02225
ACAD. GRADES	4	0.11985	0.34610	0.06678	-0.12465	0.31158	0.32657	0.10546	0.06305	0.09492	0.14968
Unus. Uses	5	0.00425	0.66765	-0.06761	0.13654	0.02589	-0.04223	0.19617	-0.07308	-0.01686	-0.10088
Brick. Flue.	6	0.18480	0.66033	0.02799	0.14660	-0.03180	-0.00951	0.04113	0.03553	0.01030	-0.15303
Brick. Flex	7	0.14557	0.68966	0.02033	0.13788	0.01137	0.03882	0.06457	-0.01401	0.03953	0.03359
Things	8	-0.04229	0.45835	-0.02849	-0.06367	0.12273	0.01747	-0.04843	0.00637	-0.04611	0.07807
TAT Novelty	9	0.14293	0.14023	-0.04575	0.05553	-0.04415	0.01628	0.02908	-0.02867	-0.02391	-0.01177
Object Quest.	10	0.31923	0.37316	0.05814	-0.02160	0.10815	0.05917	-0.03380	0.01733	0.00001	-0.06625
W.A. Flue.	11	0.08926	0.49779	0.10577	0.21874	0.21963	-0.06183	0.26556	0.04503	0.27032	0.24006
W.A. Flex.	12	0.07518	0.39301	0.07506	0.15679	0.58142	-0.09071	0.12313	0.03021	0.13397	0.14876
Wonderlic IQ	13	0.01326	0.33262	0.05696	0.15059	0.46379	0.06673	0.12392	0.10529	0.09672	0.14009
16 PF IQ	14	0.08777	0.11040	0.01596	-0.09504	0.51236	0.08444	0.07687	-0.02185	-0.02753	-0.02290
Spatial Vis.	15	-0.08997	0.01042	-0.02357	0.13231	0.50696	0.01129	0.13362	-0.06525	-0.14193	0.00483
Hidd. Shapes	16	-0.14693	0.20729	0.03461	0.01328	0.36188	0.03852	0.04775	0.10009	0.05871	-0.01198
Matches	17	0.01187	-0.01269	0.01248	-0.02581	-0.00289	-0.01356	-0.05836	-0.00725	-0.00218	0.00462
Percept. Mem.	18	-0.05193	-0.08133	0.03987	-0.13062	-0.15148	-0.17874	0.04262	-0.02317	-0.00954	-0.07142
Welsh Fig. Pref.	19	-0.00903	-0.03600	0.00682	0.00517	-0.02472	-0.02225	0.01574	0.00099	0.00672	0.00706
Theoretical	20	0.10199	-0.00722	-0.16065	0.00970	0.05058	0.32420	0.59282	-0.21408	-0.12708	-0.42324
Economic	21	-0.62897	-0.15373	-0.01572	0.17972	-0.13264	-0.23511	0.01618	-0.22720	0.13299	-0.12276
Aesthetic	22	0.54333	0.19759	-0.05842	-0.11587	0.05389	0.17571	0.08318	-0.06909	-0.18127	0.05357
Social	23	0.01370	-0.06645	0.12334	-0.04403	-0.04906	-0.09941	0.02502	-0.00607	0.81708	0.00734
Political	24	-0.18546	-0.03890	0.15438	0.06812	-0.13011	-0.18094	0.23315	-0.07488	0.07592	-0.56007
Religious	25	-0.03355	-0.02766	-0.06815	-0.03193	0.07373	0.03746	0.09752	0.89186	-0.00160	0.11076
16 A Cyclo	26	-0.06513	-0.00836	0.12944	0.51841	-0.08375	-0.08964	0.19678	0.03728	0.06463	0.08648
16 C Egostrength	27	-0.18658	0.02962	0.54217	0.06835	0.06172	-0.14423	0.08920	-0.00655	-0.00590	0.05303
16 E Dominance	28	0.16562	-0.00531	0.09997	0.49880	0.17887	-0.08945	0.06239	-0.02421	-0.20604	-0.14059
16 F Surgency	29	0.04873	0.07659	0.07213	0.63708	0.01949	-0.13704	-0.06029	-0.01800	0.01230	-0.05263
16 G Superego	30	-0.54552	-0.02297	0.10348	-0.05586	0.02580	-0.00390	-0.02950	0.03874	0.05212	0.09059
16 H Parmia	31	-0.02329	0.00736	0.34926	0.52413	0.01143	-0.13191	-0.12742	-0.04913	-0.11620	-0.00914
16 I Premsia	32	0.46924	0.03605	-0.12661	-0.08878	0.00380	0.13524	-0.03408	0.10943	-0.04839	0.32842
16 L Protension	33	0.13090	-0.00839	-0.39608	-0.03683	0.05752	0.08601	-0.02100	-0.01181	-0.07243	0.05288
16 M Autia	34	0.50485	0.08609	-0.13956	0.02148	0.02410	0.08068	0.07752	-0.06719	-0.02296	0.06315
16 N Shrewd.	35	-0.49311	-0.00235	0.25838	0.01780	0.02035	-0.00059	-0.07239	-0.01787	-0.03805	0.00942
16 O Guilt	36	0.10544	0.00836	-0.63979	-0.09224	-0.08486	-0.14733	-0.16193	0.02737	0.05662	0.16024
16 Q1 Radical.	37	0.07226	0.02705	0.09142	-0.08981	0.06051	0.00894	0.47824	-0.02699	0.00449	0.00463
16 Q2 Self-Suff.	38	0.24199	-0.07157	0.01157	-0.26173	0.19145	-0.11076	0.39763	0.15827	-0.01527	0.17660
16 Q3 Self-Sent	39	-0.49780	0.04624	0.36446	-0.13336	0.05920	0.03546	-0.03884	-0.12778	-0.02521	0.00222
16 Q4 Ergic Tens.	40	0.28261	-0.01370	-0.68403	0.04500	-0.03231	-0.04857	-0.11653	-0.04533	0.00827	-0.01228
Sent. Comp. 3-1	41	-0.05754	-0.06316	0.20015	-0.04079	-0.00214	0.01980	0.11027	-0.02332	-0.03091	-0.04538
Ego Identity	42	-0.19979	-0.00549	0.58095	-0.17302	0.01672	-0.01634	-0.12301	-0.03269	0.02967	0.04399

APPENDIX D.06 (2)

GETZELS DATA TEST IMAGE ANAL ROTATED FACTOR MATRIX PMN UNIFIED PAGE

	11	12	13	14	15
1	0.08041	-0.00590	-0.07800	0.16706	-0.03310
2	0.08002	0.09037	0.04127	0.19281	0.14673
3	0.09297	-0.07469	0.02890	-0.05181	-0.09920
4	0.00706	0.17632	0.12728	-0.02852	0.03324
5	0.00462	0.07223	0.06315	-0.10816	-0.07539
6	0.16329	-0.03735	-0.00831	-0.09445	0.23502
7	0.08418	0.04132	0.07186	0.10031	0.19953
8	0.08459	0.03185	-0.04563	-0.01155	-0.10747
9	0.12025	0.44103	0.00104	-0.05302	-0.02221
10	0.11780	0.07185	0.04807	-0.03992	0.03416
11	0.19028	0.18475	0.05349	-0.07487	-0.04249
12	0.03166	0.22294	0.17490	-0.09116	0.17213
13	0.27693	0.10930	0.09604	0.03176	-0.05179
14	0.03108	-0.15738	0.02123	0.01669	-0.03228
15	0.32385	0.04479	-0.10865	0.14988	-0.10790
16	0.14771	0.06635	0.00489	0.24019	0.17329
17	0.18877	-0.01322	0.00071	0.01307	0.36310
18	-0.12502	0.05860	-0.04017	-0.43808	0.06374
19	-0.29820	-0.01488	0.00043	-0.01054	-0.02976
20	-0.13169	-0.02236	0.17588	0.11498	0.06644
21	0.33243	-0.00413	0.30968	-0.10772	0.03763
22	-0.05171	-0.01110	0.61741	0.16929	-0.08927
23	-0.27413	-0.14688	-0.05555	-0.11218	-0.00041
24	0.22113	0.42624	-0.02033	0.02764	-0.22950
25	-0.12100	-0.17685	-0.03611	-0.01470	-0.09081
26	-0.08656	-0.06926	-0.11013	-0.10220	-0.07279
27	-0.01271	-0.04988	0.01327	0.12577	-0.05242
28	0.01229	0.25193	0.18607	0.05321	0.09952
29	0.05281	0.10081	0.03222	0.13142	-0.07238
30	-0.24766	-0.07294	0.01168	0.03667	-0.03140
31	-0.18050	0.29017	0.03473	0.00791	0.21191
32	-0.10525	0.02941	0.02115	0.03842	-0.02303
33	0.01041	-0.00756	-0.01916	-0.04256	-0.02814
34	-0.05850	-0.00231	0.09320	-0.11709	-0.04870
35	0.01988	-0.02051	0.03901	-0.04604	-0.04121
36	0.09331	-0.07888	-0.04615	-0.13394	-0.10244
37	-0.12188	0.03579	-0.02379	0.04198	-0.08556
38	0.03907	-0.13408	0.08888	0.02406	-0.08374
39	-0.13643	-0.22771	-0.04357	-0.03068	-0.03661
40	0.03690	0.01530	0.08903	0.00004	-0.03241
41	-0.00465	-0.01337	-0.01427	0.34458	0.05180
42	0.02523	-0.05223	-0.00536	-0.00076	-0.05150

MALE ART GETZELS D.07 ROTATED FACTOR MATRIX PMN UNIFIED PAGE

	1	2	3	4	5	6	7	8	9	10
	Egost.	Intell.	Diverg.	Dominance	Artistic Pers.	Theoretical		Ratings		
1	-0.10544	-0.06938	-0.01435	-0.37632	-0.06547	0.16311	-0.32531	0.42913	0.16962	0.22490
2	-0.04041	0.14438	0.10015	-0.29722	0.30914	-0.06297	-0.10876	-0.01035	0.11110	0.27569
3	0.04684	-0.08299	0.04649	-0.17407	0.17183	0.16103	-0.03396	0.81050	0.01020	0.02797
4	0.04945	0.55526	0.14110	-0.14298	0.14680	-0.01183	0.01347	0.50178	0.01383	-0.05451
5	-0.04315	0.16685	0.70222	0.00515	0.00298	0.29374	0.21463	-0.02159	0.05324	-0.17741
6	0.00448	0.12307	0.82327	0.11114	-0.02775	-0.15690	-0.14869	0.04417	-0.03775	0.06481
7	0.08427	0.17841	0.83277	0.03688	0.14435	-0.05639	-0.09052	0.01055	0.04969	-0.05655
8	-0.12406	0.22454	0.62052	-0.14480	-0.23566	-0.03752	0.13545	0.19814	0.08466	-0.07955
9	-0.06992	0.21597	0.03325	0.09810	-0.12810	-0.18215	-0.24556	0.40156	-0.36349	-0.08308
10	0.03161	0.14210	0.26527	-0.06530	0.26439	-0.11154	-0.08570	0.05998	0.04446	-0.06766
11	0.05207	0.76573	0.32844	0.02928	0.05219	0.05833	-0.10866	-0.05129	-0.16245	0.09914
12	0.07504	0.83845	0.22038	0.17151	0.11565	0.15452	-0.02624	-0.11655	0.00600	0.00198
13	0.02654	0.68319	0.14789	0.03300	-0.01128	-0.19918	-0.02347	0.14315	0.42006	-0.04523
14	-0.05704	0.32961	-0.07551	-0.03213	0.06583	0.39954	0.29991	0.18573	0.46851	0.12669
15	-0.05272	0.53221	-0.15873	0.12757	-0.16896	0.17169	-0.04262	-0.21571	0.41758	-0.01331
16	0.03293	0.28279	0.21916	0.03855	-0.22219	0.03509	0.13820	0.00207	0.41637	0.23059
17	-0.03884	0.09188	-0.02830	-0.02480	0.01855	-0.00324	-0.04888	-0.10806	-0.06421	0.03795
18	0.06552	-0.00759	-0.06991	-0.14049	-0.08012	0.12418	0.09601	-0.01213	-0.79413	-0.00560
19	0.08780	-0.10401	-0.05319	0.02132	-0.07075	0.04101	0.09221	0.01585	0.03625	0.15094
20	-0.02017	-0.10709	-0.00482	-0.11805	0.10607	0.69458	-0.20018	0.18886	0.08185	-0.24050
21	0.18012	0.05829	-0.08403	0.07025	-0.46056	-0.32208	0.06769	-0.38160	0.03179	-0.42579
22	-0.15907	0.05271	0.04048	-0.05811	0.81263	0.07881	-0.04016	0.12277	0.08857	-0.20659
23	0.05808	-0.00199	0.07639	-0.01152	-0.13030	-0.15211	0.08020	-0.02375	-0.11803	-0.04681
24	-0.05687	0.01091	0.11132	0.10547	-0.42770	-0.18010	-0.05332	0.04549	-0.11784	-0.30905
25	-0.02362	0.03066	-0.11723	0.02495	0.01180	-0.09474	0.08585	0.04423	0.02955	0.91395
26	-0.00606	-0.07589	0.07979	0.57608	-0.16724	-0.16482	0.23451	-0.15530	-0.05742	0.37641
27	0.71236	0.11517	0.10579	0.19599	-0.04510	0.08308	0.09634	-0.33143	0.05740	-0.03881
28	0.20452	0.26067	-0.14154	0.57075	0.11058	0.04726	-0.44358	-0.10534	0.13636	0.02558
29	-0.01635	0.11498	0.04658	0.81148	-0.15743	-0.09185	-0.06153	-0.06076	0.12080	-0.01362
30	0.10795	0.02610	-0.13521	0.05398	-0.10761	-0.05327	0.80329	-0.06032	-0.03119	0.19371
31	0.41661	0.01983	0.07690	0.76128	-0.00033	-0.00950	0.00567	-0.10005	-0.03098	0.03478
32	-0.27715	0.07141	0.02673	-0.15601	0.69157	-0.09829	-0.07784	0.13841	-0.00062	0.23093
33	-0.46441	0.24072	0.08440	-0.07150	0.15174	-0.00476	0.01598	0.05650	0.02848	-0.08534
34	-0.32327	0.33537	0.15790	-0.06792	0.45794	0.07359	-0.27265	-0.04438	-0.26980	0.08782
35	0.40215	0.02436	0.04632	-0.04228	-0.18313	-0.25039	0.25087	0.10720	0.04055	0.03038
36	-0.75182	0.04740	-0.02229	-0.09933	0.11797	-0.27296	0.19853	-0.09861	-0.09992	0.07875
37	0.14975	0.22189	-0.04406	-0.08173	-0.03261	0.75951	-0.00118	0.07831	-0.13494	-0.01949
38	0.23654	0.11844	-0.23970	-0.47548	0.26153	0.36847	-0.33299	-0.06877	-0.04085	0.18574
39	0.52169	-0.18632	-0.01161	-0.16747	-0.09002	-0.03695	0.60887	-0.11568	0.04927	-0.08079
40	-0.76633	-0.11603	0.09577	-0.01656	0.26022	-0.06833	-0.15129	-0.06898	0.11412	-0.03764
41	0.06203	0.11045	0.01223	-0.06338	0.04522	-0.03335	0.03997	0.08924	-0.01043	-0.05657
42	0.71218	0.09705	0.07068	0.15918	-0.00072	-0.19850	0.13518	0.09061	-0.11427	0.02501

MALE ART GETZELS D.07(2) ROTATED FACTOR MATRIX PMN UNIFIED

	11	12	13	14	15
1	-0.22697	-0.00942	0.07573	-0.17196	0.14965
2	-0.23748	0.11255	0.20211	-0.45911	0.16192
3	0.02361	0.04455	0.08114	-0.08277	-0.00337
4	0.31469	-0.05613	-0.11907	0.04573	-0.07459
5	-0.05072	0.06257	0.12897	-0.01399	-0.08481
6	-0.04651	-0.09929	0.04353	-0.06599	-0.16567
7	0.04950	0.04131	-0.05985	0.00644	0.02939
8	-0.06966	0.03672	-0.09138	0.09299	0.07109
9	-0.27941	0.20362	0.03093	-0.23311	-0.22152
10	0.00602	0.23175	-0.06673	0.05842	-0.66532
11	0.01570	-0.16844	0.06779	0.15622	-0.03857
12	-0.05797	0.05737	0.02728	-0.06817	0.02377
13	-0.11481	0.08812	0.06795	0.05069	-0.00722
14	-0.18375	0.16339	-0.04953	0.04098	0.04147
15	-0.11091	0.18069	0.21927	0.02591	-0.08883
16	-0.17643	-0.01558	0.32903	-0.04526	-0.36950
17	-0.05938	0.04718	0.16804	0.84366	-0.02964
18	-0.10945	-0.06977	0.04940	0.16271	0.03350
19	0.83609	-0.02082	0.09081	-0.02364	0.03391
20	0.19840	0.03427	0.31356	-0.08541	0.04424
21	-0.11171	0.05509	-0.11381	0.07200	0.20808
22	-0.05709	0.17038	-0.02953	-0.01810	-0.16690
23	-0.01461	-0.83477	-0.06802	-0.02522	0.05662
24	-0.14046	0.53610	0.09002	0.04427	-0.14103
25	0.09064	-0.00574	-0.03876	0.01585	0.01856
26	-0.05950	0.14552	0.00113	0.01024	0.26670
27	0.04361	0.09912	-0.05043	-0.03785	-0.02128
28	-0.05118	0.23326	-0.01873	0.06755	0.04056
29	0.06281	-0.03202	-0.13689	-0.06868	-0.16025
30	0.04973	-0.09893	0.03972	-0.05388	0.07826
31	-0.04515	-0.03941	0.09553	0.00422	0.13287
32	-0.09805	-0.12876	0.12986	0.04319	0.14646
33	0.31950	0.13412	-0.18928	-0.20377	0.44236
34	0.25371	0.06432	-0.04746	-0.08749	-0.13543
35	0.17591	0.27228	-0.18518	0.30172	0.28382
36	0.05303	0.10008	0.00079	-0.07060	0.06886
37	-0.09542	0.08528	-0.24163	0.03917	0.02396
38	0.11047	0.02976	-0.16247	-0.16333	0.11150
39	0.16895	0.02552	-0.05081	0.00830	-0.02096
40	-0.17173	0.07239	-0.01121	-0.01354	0.11930
41	0.07226	0.09199	0.83924	0.14356	-0.00086
42	-0.07110	-0.02742	0.11850	-0.15984	0.16824

FEMALE ART GETZALS D.08 ROTATED FACTOR MATRIX PMN UNIFIED PAGE

	1	2	3	4	5	6	7	8	9	10
	Divergent	Egostrength	Intelligence	Dominance	Ratings/Grades	Self-Sufficiency				
1	0.02506	0.14381	-0.08881	-0.09618	0.60670	0.18187	0.11890	0.26104	0.17221	-0.17985
2	-0.12961	-0.09406	-0.00631	0.08754	0.62903	-0.07411	-0.17269	0.15844	-0.03921	-0.13389
3	0.01088	0.05346	0.14328	-0.12073	0.87450	0.01404	-0.10462	-0.03725	0.04942	0.00114
4	0.28960	0.01785	0.44125	-0.01389	0.50418	0.05611	0.08387	-0.03357	0.20595	0.03390
5	0.77850	-0.05383	0.09313	0.15996	-0.01846	0.01986	-0.16005	0.01411	0.06856	0.10863
6	0.87451	-0.01159	-0.07354	-0.01477	-0.05496	0.13368	-0.16986	0.03750	-0.01874	-0.01147
7	0.83669	-0.06056	0.12014	0.11073	0.10177	0.00759	-0.05478	0.02606	0.13552	-0.07076
8	0.28162	0.11027	0.16155	0.01048	0.11366	0.03416	-0.23824	-0.40707	0.33671	-0.02129
9	0.18937	-0.11025	0.10587	0.21384	0.00229	0.16462	-0.04042	0.06799	-0.08229	0.78144
10	0.46381	-0.10867	0.11648	0.12049	0.27852	0.44007	0.06069	-0.18246	-0.08706	0.18923
11	0.68544	0.09459	0.36213	0.01628	-0.01774	-0.04960	0.26622	0.10037	-0.02674	0.16643
12	0.47574	0.07322	0.57755	0.12529	-0.06851	0.11703	0.27387	0.08372	0.12912	-0.01066
13	0.34496	0.03525	0.69646	0.06226	0.10351	-0.00805	0.06410	-0.11656	0.06059	0.17102
14	0.10738	-0.06973	0.39508	-0.10805	0.01098	0.16292	0.16867	0.18525	0.28915	-0.00960
15	-0.04347	0.00230	0.76800	0.00069	0.18033	0.04390	-0.23763	0.05181	-0.03798	-0.06563
16	0.05014	0.11025	0.73869	-0.03112	0.01048	-0.06018	-0.08253	-0.09324	0.03543	-0.10308
17	0.12504	-0.03485	0.02703	-0.01402	0.09383	-0.05949	0.02891	0.01528	0.01617	0.01429
18	-0.15384	-0.00383	-0.20830	-0.04221	-0.36245	-0.18538	0.03895	-0.04432	0.09283	0.66205
19	-0.06503	-0.06572	-0.00925	0.01366	-0.09298	0.04979	0.09383	0.08843	-0.02936	-0.01139
20	0.12088	-0.08173	0.01712	0.00462	0.15200	0.05735	-0.32127	0.68498	0.14024	-0.09481
21	-0.11999	0.03047	0.03104	0.00529	-0.04906	-0.80183	-0.06387	0.14564	-0.14209	-0.00249
22	0.21221	-0.11963	0.06680	0.14653	0.15634	0.39044	-0.38594	0.06579	0.48729	0.11513
23	-0.14464	0.04434	-0.05122	-0.06629	-0.08594	0.06078	0.86486	-0.05205	0.01964	-0.02446
24	-0.11769	0.18436	-0.06754	0.22430	-0.11708	-0.08018	-0.06613	0.10246	-0.76895	0.08953
25	-0.06323	-0.05000	0.03395	-0.24323	-0.02535	0.18144	-0.05849	-0.80313	0.13584	-0.08199
26	0.02324	0.08652	-0.14239	0.66135	-0.01416	-0.31744	0.32107	-0.09219	0.00171	-0.02445
27	-0.04186	0.45164	-0.01171	-0.04199	0.00063	-0.03261	0.09231	-0.07120	-0.10299	-0.19022
28	0.26630	-0.10801	0.08203	0.71462	-0.03040	0.06929	-0.25199	0.16778	-0.07121	0.06125
29	0.18197	-0.10387	0.14602	0.67431	-0.12877	0.05761	0.04483	0.16335	-0.10528	-0.10800
30	-0.12995	0.56906	-0.11289	-0.13631	0.05972	-0.33833	0.19977	0.03740	0.25862	0.13011
31	0.01410	0.21388	-0.02932	0.81149	-0.04074	0.04691	-0.11509	0.08273	-0.08424	0.17522
32	-0.01174	-0.12060	0.06335	-0.09302	-0.03285	0.31556	0.09519	0.02420	0.16764	0.03373
33	-0.12474	-0.59739	-0.11741	-0.01199	0.18823	-0.00511	-0.13157	-0.18022	0.08080	-0.00222
34	-0.00755	-0.33702	-0.16873	0.12572	0.13626	0.13989	-0.09477	0.21895	0.28218	0.06491
35	-0.07615	0.55035	0.03822	-0.00782	-0.06171	-0.46545	-0.02893	-0.06032	0.02262	0.03035
36	0.00378	-0.75105	-0.13787	-0.32249	-0.15730	-0.09551	0.18062	-0.01882	0.11877	0.08941
37	0.04206	0.10357	-0.00461	-0.10093	-0.08850	0.10894	0.08086	0.13917	0.10821	0.07128
38	-0.02174	-0.05698	0.31694	-0.31043	-0.07154	0.46770	0.01078	0.02202	0.42248	-0.06296
39	-0.01595	0.59371	0.02338	-0.11045	0.09589	-0.32261	0.18982	0.00266	0.07454	-0.13909
40	-0.01310	-0.81636	0.02665	0.05000	-0.04320	-0.06803	-0.04945	0.04324	0.15211	0.06956
41	-0.11966	0.24253	0.05060	0.33662	-0.20096	0.15731	0.08588	0.08686	0.19590	-0.46558
42	-0.13230	0.57778	0.06736	0.27639	-0.14090	-0.19444	0.04393	-0.08841	-0.04334	0.01647

D.08 (2)

	11	12	13	14	15
1	0.11432	-0.22483	-0.04029	-0.14395	-0.28587
2	0.18177	-0.00440	-0.24152	-0.10848	0.35383
3	0.00092	-0.02161	0.01826	0.07524	-0.05020
4	-0.07633	0.23664	-0.04103	0.14100	0.05675
5	-0.16052	0.00942	0.18031	0.00623	-0.20244
6	0.14695	0.05233	-0.06056	-0.05051	-0.00180
7	0.16928	0.08403	-0.09773	0.03982	0.03658
8	-0.29414	-0.02385	0.30896	-0.06748	-0.02491
9	0.04563	0.02723	-0.10998	-0.06945	0.15390
10	0.07108	0.20091	0.06956	-0.00677	-0.19269
11	-0.08313	-0.18555	-0.06710	-0.04618	0.21796
12	-0.33221	-0.14629	-0.01078	0.00571	0.07631
13	-0.09183	0.24474	-0.08421	0.17283	0.10371
14	-0.00090	0.24246	-0.18075	0.37940	-0.29018
15	0.00991	0.01428	-0.03856	-0.12008	-0.01852
16	0.28537	-0.18495	0.14169	-0.05404	-0.03690
17	0.89116	-0.02010	-0.06427	-0.03121	-0.02871
18	-0.01052	0.13461	0.14054	-0.03959	-0.17757
19	-0.07955	0.01644	0.85613	-0.00480	0.12068
20	-0.10773	0.33387	-0.04953	-0.12528	0.05025
21	0.11662	-0.07177	-0.05072	0.01793	-0.17944
22	0.08868	-0.14558	0.11264	0.05909	0.17501
23	0.04271	0.06043	0.09255	0.05532	0.03622
24	-0.04030	-0.15696	0.03932	0.04863	-0.07429
25	-0.06832	0.02318	-0.16814	-0.06587	0.01212
26	-0.07228	0.22801	0.09407	-0.30236	0.10662
27	-0.03388	-0.06831	-0.02495	0.71910	0.01653
28	-0.12123	-0.01136	-0.02133	0.05689	0.03703
29	0.10444	-0.18709	-0.09796	-0.12359	-0.13400
30	-0.07332	-0.22570	0.04738	-0.14702	-0.18846
31	0.04516	-0.11169	0.05447	0.13515	-0.05339
32	-0.06138	-0.01208	0.24051	0.03294	0.71300
33	-0.08630	-0.03630	-0.23423	0.18293	-0.04460
34	-0.03734	0.13543	0.28113	0.45017	0.16109
35	-0.10019	-0.14501	-0.17038	-0.02311	-0.06336
36	0.05953	-0.13305	0.00785	-0.10060	-0.14252
37	0.00498	0.81511	0.02185	-0.02159	-0.01864
38	-0.09970	0.11888	-0.30285	0.07005	-0.00950
39	-0.15815	-0.00142	-0.18445	-0.05994	-0.28376
40	-0.03018	-0.15050	0.03702	-0.17818	0.11747
41	0.39240	0.16059	-0.10177	0.20247	0.10985
42	0.17809	-0.17482	-0.03616	0.28395	0.09522